A Database Publication

electron user

Vol. 6 No 1 October 1988 £1.25

WIN
Music 5000
or Cuddly
Repton

3 explosive games

Arcade action
with Pistol Shooting
and Gobbler

Educational fun
with Spencer Spider

DIY electronics manual reviewed

Basic rom routines revealed

New Music 5000 16 channel stereo synthesiser on test

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Back to school

10 educational games for the Electron for just £5.95

Gallup Software Chart

THIS MONTH	LAST MONTH	TITLE (Software House)	COMMENTS	PRICE
1	▲1	BARBARIAN *Superior*	If you are a fan of games which simulate physical combat, martial arts and the like, you will find Barbarian an excellent aquisition.	9.95
2	▲2	SOCCER BOSS *Alternative*	Still in second place behind Barbarian and holding its own against a host of new releases. Excellent value for this football manager-type game.	1.99
3	•	RAVAGE *Blue Ribbon*	Highest new entry this month is from Blue Ribbon. This one should stay around for a while. Look out for Ribbon's new CDS release.	1.99
4	▲5	ROUND ONES *Alternative*	Breakout strikes again, with you controlling a B.A.L.L. – a Block Assault Laser Launch. The usual mystery blocks abound.	1.99
5	▼3	REPTON THRU TIME *Superior*	This new one only reached third place, yet still a must for anyone loathe to miss any Repton screen. As usual, plenty of puzzles and challenges.	6.95
6	▲16	STEVE DAVIS SNOOKER *Blue Ribbon*	Back in the Top Ten again – and as long as Steve Davis continues to win snooker matches this game will continue rearing its head.	1.99
7	•	CREEPY CAVE *Atlantis*	A strange place to lose your keys, but stranger things have happened. Fun, colourful and an enjoyable romp chasing a mischievious ghost.	1.99
8	▼4	STAR FIGHT *Alternative*	Into the great unknown – a fun and simple space shoot-'em-up. Not the most original concept, and this one doesn't offer anything new.	1.99
9	▼6	COMBAT LYNX *Alternative*	This wartime helicopter simulation sets a mission for the more adventurous. A good introduction to the world of flight simulators.	1.99
10	▲14	AROUND THE WORLD IN 40 SCREENS *Superior*	Repton's second appearance in the chart, and still looming large. This time on a trek through the Orient, America, Africa, the oceans and the Arctic.	6.95
11	▼7	PSYCASTRIA *Alternative*	An old favourite which is still in the charts – join in by shooting ammo dumps while avoiding the aliens in this scrolling shoot-'em-up.	1.99
12	▼8	SPY CAT *Superior*	Spycatcher spoof, with you trying to escape to Greenland to write your memoirs, on the way visiting No 10 and avoiding surveillance.	9.95
13	▲18	WAY OF THE EXPLODING FIST *Mastertronic*	Martial arts is a perennial favourite both with software houses and gamers. This is a good budget priced example of the genre.	1.99
14	▼12	PAPERBOY *Elite*	This arcade conversion is your chance to deliver your neighbour's morning papers with the maximum of damage – beware of dogs and cars.	9.95
15	▲15	BRIAN JACK'S CHALLENGE *Mastertronic*	How many people remember either Brian or the television programme Superstar Challenge? If you do it might stir some memories.	1.99
16	▼13	TRIPLE DECKER 3 *Alternative*	Compilations are always about and Alternative has produced 10 Triple Deckers now. Here are Lunar Invasion, Lunar Lander and Jam Butty.	1.99
17	•	QUEST *Superior*	The addition of gimmicks like the jet boots and computer terminals maintain the interest. A nice arcade game which is more than a little addictive.	9.95
18	•	ANARCHY ZONE *Atlantis*	This must rate as a superb bargain arcade game that mustn't be missed. If you like fast action you'll be quite at home.	1.99
19	•	CHUCKIE EGG *A&F*	One of the very earliest games it has returned to the charts. Beware of ostrichs and ducks as you search for eggs among the ladders.	9.95
20	•	GRID IRON *Top Ten*	If you want a rest from the English weather and football, cross the Atlantic to manage an American Football team with all the associated problems.	2.99

electron user NEWS

Wet weather boosts market prospects

WET weather this summer has apparently not dampened Electron users' enthusiasm for computing.

Perhaps because indoor activities have been appropriate, sales of Electron products have held up well during the summer months, an *Electron User* survey reveals.

"We expected a quiet period during which we could get on with designing new products," said Pres boss John Huddleston.

"Instead we've been working flat out to meet demand for existing products while still maintaining a heavy programme of new product development.

"Interest in the AP7 battery-backed ram has been keen, even before the official launch, and the Advanced Games Compendiums have sold very well.

"And response to the Music 5000 synthesiser shows that Electron owners welcome opportunities for exciting new experiences in computing.

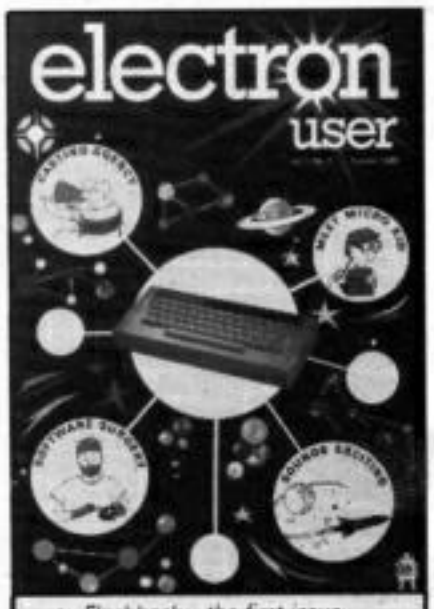
"We're very encouraged that people appreciate our strategy of upward compatibility to the BBC range in the design of our products".

Work continues at Pres on Advanced Basic Editor+, Advanced File Manager and the 1MHz Bus unit.

"The AFM is currently being documented and should be ready for launch at the Electron & BBC Micro User Show in November", said Huddleston.

The show takes place at the New Horticultural Hall, Greycoat Street, London, on November 11 to 13.

A money-saving advance ticket order form is on Page 13.



Flashback – the first issue

Changing with the times

WELCOME to your new-look *Electron User*. Its comprehensive re-design is intended to reflect the way the machine and its users have developed in recent years.

Features presented in three columns per page make for easier readability, particularly in the listings section.

The software reviews will retain their recently introduced colourful format – but reviews will be bigger and there will be "second opinions" on every game.

"In line with the way the user base has matured, *Electron User* will be more serious, less juvenile in its content and appearance", said Features Editor Roland Waddilove. "We look forward to hearing from readers about their reactions".

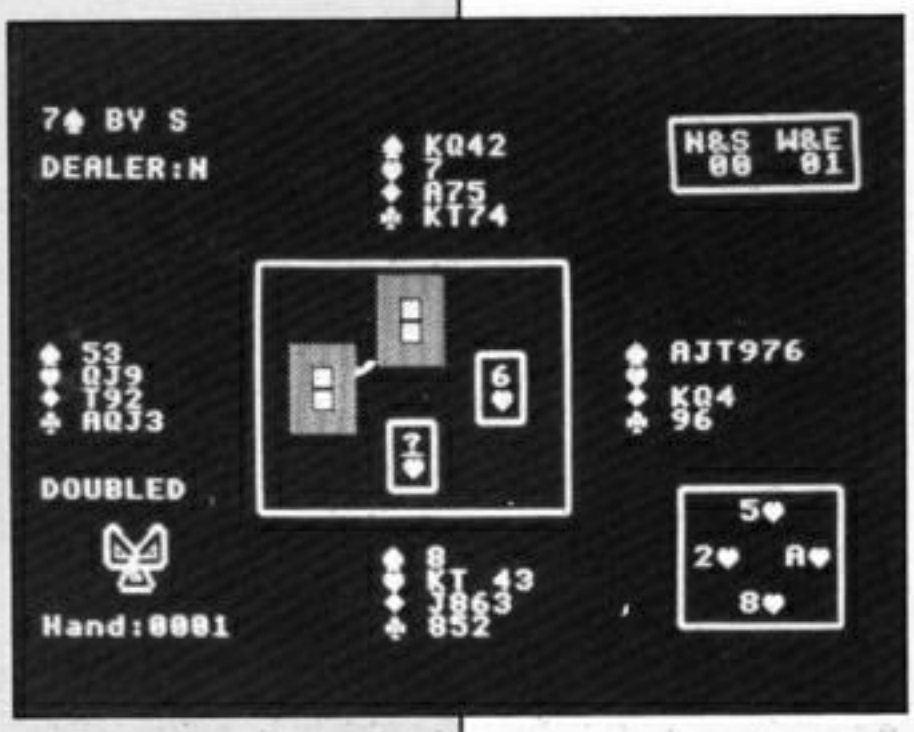
Take a hand..

AN Electron version of the best-selling card-play simulation Colossus 4.0 Bridge has been released by CDS Software.

It serves as a tutor for beginners and a practice opponent for experienced bridge players.

"The program plays the Acol system and incorporates three popular conventions – Blackwood, Stayman and Baron", said CDS marketing manager Dave Carlos.

Colossus 4.0 Bridge from CDS (0302 21134) costs £11.99.



Electron in a class of its own

ELECTRONS play a big role in the lives of children at Carlton Green Primary School, Lancs.

There are 11 machines at the school where they are used in a variety of administration and teaching applications

"Many pupils also have their own Electrons at home", said Peter Higgins, the teacher who began Carlton Green's computer programme six years ago.

"The children often initiate projects on their own cassettes and then bring them to school for further development.

"The beauty of the Electron is that we can use it as a workstation for the entire upwardly compatible Acorn family with the aid of View, Mini Office and other programs and networking on the BBC Micro and Master.

"Almost anything is possible – I'm sitting here with an Electron producing worksheets.

"I'm running a database and even doing desktop publishing on it, using the disc drive as memory with shuttle load and save.

Peter Higgins is leaving Carlton Green to take up a headship at another local school this term – "But Electron computing will be one of the first projects I shall undertake in my new job", he promised.

10 LINERS

Scroller

Written by Paul A.Clarke

MESSAGE scrolling utilities have appeared from time to time in various computer magazines – but here's one with a difference.

Message Scroller from Paul Clarke is a machine code program which scrolls a small text window – 32 characters wide by 1 character deep – across a Mode 4 screen.

The first difference is that this version doesn't scroll character by character, but pixel by pixel. And as it's in machine code, you're not limited to using graphic modes only.

Although the display as set up in the program will look best in Mode 4, you can use the utility in any other two-colour mode by altering the value of *start* in line 30 – but you must set it to a valid 16 bit address within the screen memory.

The width of the window is always 32 bytes – or characters – from *start*, so bear this in mind when trying to centralise the window in 80 column modes.

The second difference is that the scrolling is carried out under the control of interrupts. This means that once you've run the program, you can load, edit and run other Basic programs without disturbing the scrolling.

Of course, should you overwrite the message window in the process, it'll corrupt the scrolling message.

```
   10 REM Message Scroller
   20 REM By Paul A.Clarke
   30 MODE4:start=&7898:FORI
=0TO2STEP2:P%=&900:[OPTI
   40 LDX#0:.loop1 LDA start
,X:CLC:CMP#128:BCSstore:LDA#
0:STA&70,X:.ret1 LDA start,X
:ASL A:STA start,X:INX:CPX#8
:BNEloop1:.main LDX#8:.loop2
 LDA start,X:AND#128:CMP#128
:BEQaddnext
   50 .ret2 ROL start,X:INX:
BNEloop2:LDX#0:.loop3:LDA&70
,X:CMP#1:BEQstoreend:.ret3 I
NX:CPX#8:BNEloop3:RTS:.store
 LDA#1:STA&70,X:JMPret1:.add
next CLC:LDA start-8,X:ADC#1
:STA start-8,X:JMPret2
   60 .storeend CLC:LDA star
t+248,X:ADC#1:STA start+248,
X:JMPret3:]:NEXT
   70 COLOUR129:CLS:COLOUR12
8:FORT%=0TO255STEP4:!(T%+sta
rt)=0:NEXT:PRINTTAB(4,26);"W
ritten by Paul A.Clarke";:?&
220=0:?&221=9:*FX14,4
   80 VDU23,128,&F0F0;&F0F0;
&F0F0;&F0F0;:GCOL0,0:COLOUR1
29:COLOUR0:PRINTTAB(0,0);"Sc
roller"
   90 VDU5:X=72:Y=700:FORT=1
020TO992STEP-4:FORM=0TO256ST
EP4:X=X+16:IFPOINT(M,T)=0 MO
VEX,Y:VDU128
  100 NEXT:Y=Y-32:X=72:NEXT:
VDU4,23,1;0;0;0;0;:PRINTTAB(
0,0);STRING$(8,CHR$32):REPEA
TUNTIL0
```

ROM MANAGER

```
   10 REM Rom Manager
   20 P%=&900:FORY%=0TO7:REA
DA$:FORX%=1TO59STEP2:?P%=EVA
L("&"+MID$(A$,X%,2)):P%=P%+1
:NEXT:NEXT:CALL&900
   30 DATA AD0902101 2A94C8D8
702A9BE8D8802A9098D890220D10
9A20FA9019D7008
   40 DATA CA10FA6060A690A49
16C300286908491A001B190C952D
0EDC8B190C90DD0
   50 DATA E6A90F8594A95220E
EFFA96F20EEFFA96D20EEFFA9202
0EEFFA594C90A90
   60 DATA 0318690718693020E
EFFA694BD7008F005BDA002F042A
92020EEFFA90985
   70 DATA 92A9808593A59285F
6A59385F7A49420B9FFC900F0132
0EEFF18A5926901
   80 DATA 8592A593690085934
C7D09A694BD7008D00AA92020EEF
FA92A20EEFF20E7
   90 DATA FFC6941088A690A49
16020D109A20FBD7008D005A9009
DA002CA10F360AD
  100 DATA 09021016AD08028D3
002AD09028D3102A92A8D0802A90
98D090260000000
```

ROM Manager from David Manning is a routine for disc users only which allows you to display a list of all roms present in your Electron. It also provides the facility to disable any of them at will until they are either re-enabled, or the power is turned off.

This last feature is a very useful, as some roms interfere with various games programs or claim more workspace than you can afford to lose.

Rom Manager works by using the buffer for sound channel three – from &870 to &87F – to hold a list of those roms currently disabled.

So long as this area is left alone by not using sound channel three, Rom Manager will remember the status of all 16 roms, even after a Control+Break. This is achieved by using osbyte 247, 248 and 249 to cause any depression of the Break key to scan Rom Manager's private table.

If any rom is listed as disabled, a zero is poked into the Electron's own rom table at &2A0-&2AF, preventing that rom from being subsequently recognised by the operating system.

Once run, the Rom Manager Basic program may be NEWed, leaving the machine code utility permanently installed in page &900.

Running any other utility which needs this area is not recommended, as it could cause a crash on the next star command or pressing the Break key.

To list the roms type *R. This causes the titles of all 16 to be displayed beside their socket numbers, unless any sockets are empty. Disabled roms will be shown, with an asterisk next to their name.

To disable or re-enable a rom, type:

```
?&2AX=0:REM disable
?&2AX=1:REM enable
```

where *X* must be a socket number between 0 and F. It's useful to do a *R prior to disabling or re-enabling any roms, so that you can see the number of the one you want to deal with.

It's best to press Control+Break after disabling or re-enabling a rom, so that the operating system can properly test for its presence. Users of Pres's new AP2 rom and BBC Master owners will be familiar with this method of rom handling.

Don't try disabling the Basic rom though – you'll have to turn your Electron off and on again to regain control, because the ? indirection operator used to re-enable roms is only available from within Basic.

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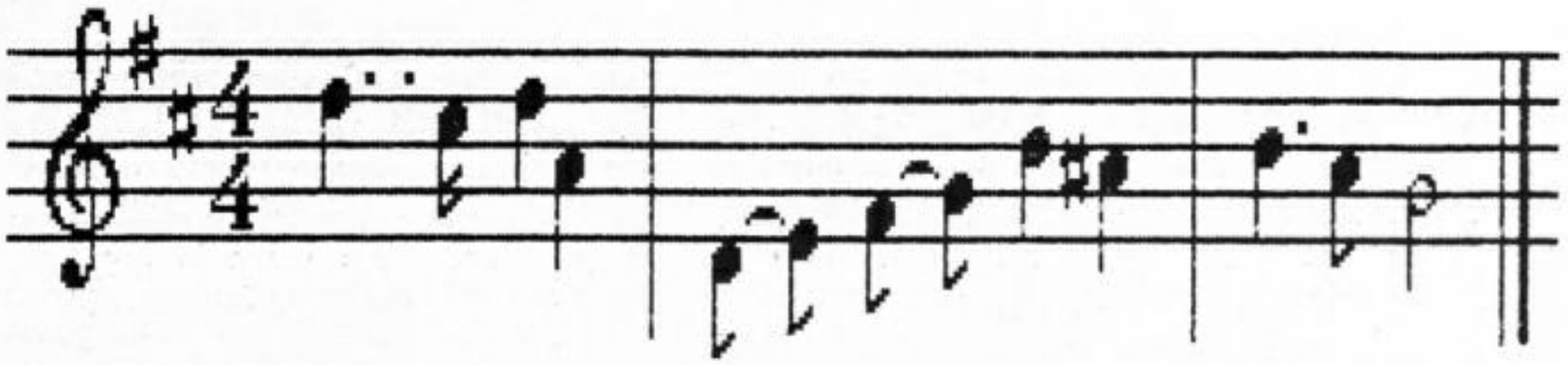


They're playing your tune, Electron

WHEN Acorn launched the Electron it is probably true to say that no one envisaged it being used to control a music system. Much less, I'm sure, did anyone suspect that it would one day be at the centre of a digital synthesiser complete with programmable instruments, a computerised mixing desk, stave editor and its own MCL (Music Composition Language).

Well now, thanks to the efforts of Hybrid Technology and Pres, it is.

The Hybrid Music System was originally developed to run on the BBC Micro and it is now available for the Electron. Happily however, it is not a cut down version but a full-scale implementation of the system, with only one or two functional differences which we'll look at in a moment.

The first thing you need – apart from the Hybrid Music System itself – is a couple of interfaces. You'll need the Pres AP5 interface and an &E00 DFS, plus a disc drive. You also need suitable amplification. You can listen to the system through your hi-fi or even through headphones, but the output is in stereo so a hi-fi system will give you the best results and is much recommended.

Ian Waugh examines the Hybrid Music System, once only available for the BBC Micro but now adapted for the Electron

The system runs under a new language called Ample (Advanced Music Production Language and Environment). The Ample rom plugs into the AP5's internal rom socket and a ribbon cable from the hardware box, which contains all the synthesiser bits, plugs into the 1MHz bus. As the software is rom based it doesn't use precious memory, although modules must be loaded from disc (modules coming up) as required, the same procedure as used with the BBC Micro version.

The box containing the hardware is exactly the same as the BBC Micro unit and the manual is the one supplied with the big brother version. An additional two-page leaflet describes the differences between the systems, and these are really quite minor.

Operation is exactly as described in the User Guide except for some differences in display and the keyboard. For example, you must press Control+I instead of Tab, and Func and a key for the function keys – but Electron users are used to doing that now. Four other key substitutions must be made, too.

The BBC Micro version uses Mode 7, whereas the Electron uses Mode 6 with a consequent lack of colour. In the Staff Editor this results in horizontal lines which divide the display. It's still perfectly useable, if a little odd.

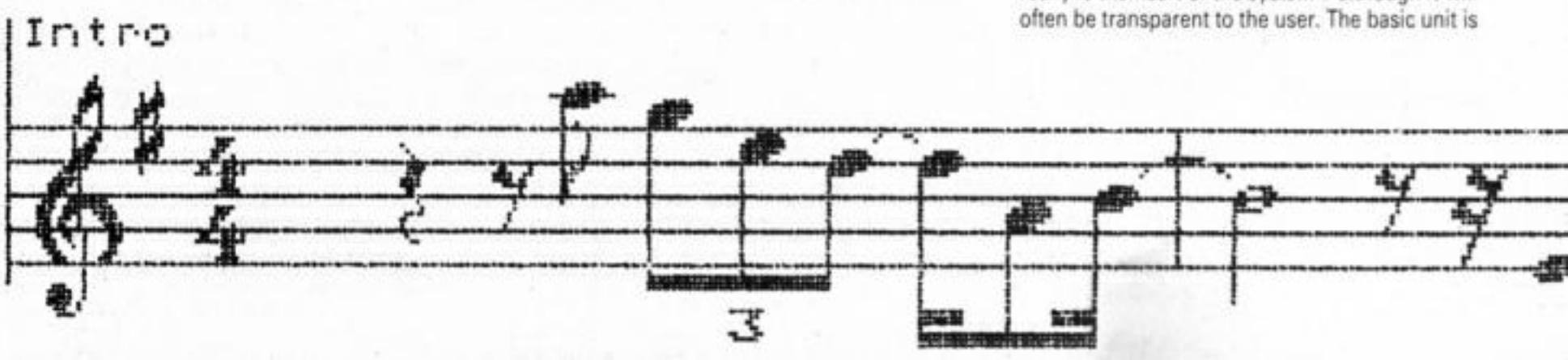
Having booted up, you are presented with the front end of the system called the Studio 5000. From here you can enter any of the three main modules – the Mixing Desk, Staff Editor and Notepad – as well as loading and saving programs, although all this can also be done from the other modules.

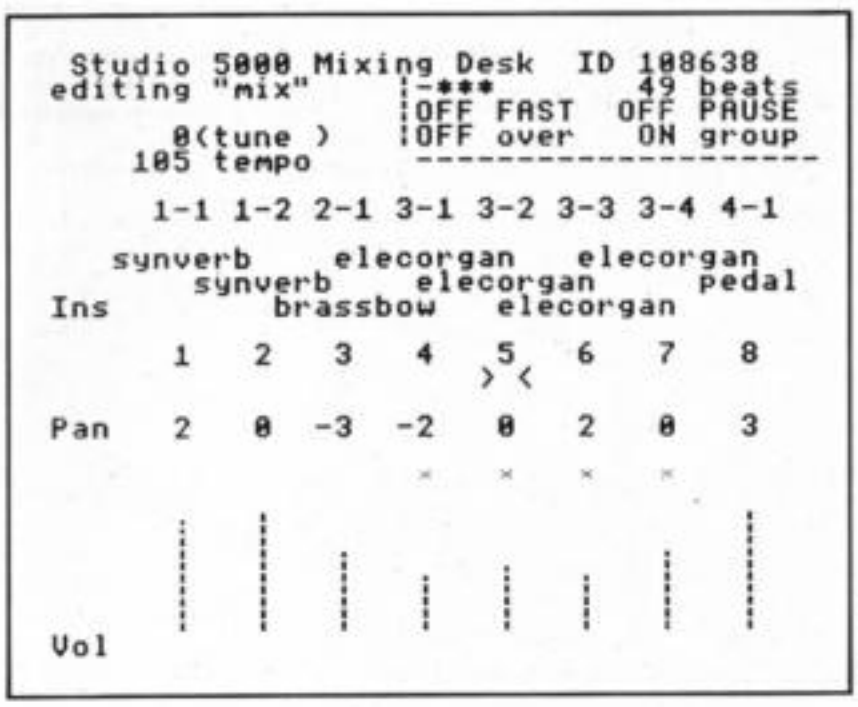
The first thing you'll want to do is load and play the set of demo programs. Pressing f9 loads a Juke Box which makes selection simple and easy. Some of these pieces are extremely impressive. If you have ever cocked an ear at Hybrid's stand at the Electron and BBC Micro User Shows you'll know what I mean. After being suitably impressed you can go back to the Studio 5000 menu and work your way through the modules.

Before taking you on a guided tour, it's worth saying a few words about Ample, because it really is the heart of the system – although it will often be transparent to the user. The basic unit is

```
   Studio 5000 Notepad          ID 108638
 got "jupiter" to make "jupiter"
 trying "RETGATE"
--------------------;--------------------
24,
    % phrase 1

0: eG A/ACbg CDc/b/ aBa/g/ e///
0: eG A/ACbg CDc/b/ Edc/D/ c///

    % phrase 2

0: Ge d/d/cE d/g/Ge d/d/Eg A///
0: aB C/b/a/ g/C/e/ dcD/E/ G///

    % phrase 1, an octave higher

1: eG A/ACbg CDc/b/ aBa/g/ e///
1: eG A/ACbg CDc/b/ Edc/D/ c///

--------------------;--------------------
 %SHOW
do          jupiter
2 words, no data
 %
```

The Notepad showing part of Holst's Jupiter in Ample notation





Mixing Desk – all parameters can be altered on the fly

the word, and words can contain anything or be defined to do anything. For example, a word can contain a riff, a chord sequence, an instrument definition or it can call up an action such as a tempo change.

Words can be defined in terms of other words, and there will eventually be a single word at the very top of your program which will start all the music lines playing at once.

Operations are stack based and Ample syntax is similar to the postfix notation used in Forth. If you're not a postfix fan, however, don't let that put you off because the system is quite easy to understand and use. No stack use is necessary except for advanced programming. In normal use you simply put the number before the word, for example, 6 MODE, "filename" LOAD, 8 VOICES, and so on.

Language buffs note: Ample is a complete language – in fact the Studio 5000 software was written largely in Ample. We lesser mortals, can simply use the music parts of the language to produce music.

As well as supporting traditional notation Ample contains its own music composition language (MCL) which is ultimately more flexible and versatile; more of this in a moment. Hybrid has designed the system and software to be fully expandable, and new features can be used simply by installing new software modules.

Time to open the User Guide. It is excellent and leads you gently through the system. The first module it describes is the Mixing Desk and we'll follow suit and do likewise.

This screen displays a mixing desk console. The system generates 16 sound channels which are normally paired to produce eight two-channel voices, although you can use all 16 on one voice if you wish. The mixer has eight channels – one for each voice – complete with faders, stereo positioning (pan pots) and volume meters.

The instruments playing on each voice are shown above the pan pots. Pressing Shift clears the bottom half of the screen and gives you a list of available instruments which can be selected with the cursor keys. Releasing the Shift key will transfer that instrument to the mix.

Changing instruments on a voice can take place while the music is playing so you can hear how the piece sounds as you make alterations. This concurrency is an important part of Ample and you'll find you can alter most parameters while music is playing.

You can pan a sound through seven stereo positions, transpose the piece and alter the tempo. When you've produced a mix you like, type MAKE and the system will automatically produce a word containing all the settings. You can produce several different mixes or sub-mixes and use them at any point in the music.

You can pause and fast forward the music and you can step through it a beat at a time. Many of these features are only possible with a computerised system.

The staff editor

The next module in the book is the Staff Editor. This supports the full range of notes, rests and accidentals along with slurs, triplets, duplets, dots and ties. You don't have to use bar lines but if you do the system will automatically check the length of each bar. You can define the on-time of the notes to produce legato and staccato phrasing, and can include dynamics (volume) and accents.

Chords can be entered, too, although the notes are staggered across the stave rather than appearing vertically. Coupled with the horizontal lines, it does give a rather broken appearance to the screen but it is quite easy to adapt to.

You can program non-standard key signatures and define words relating to performance expression. You can also produce percussion patterns on the treble clef.

The Staff Editor is ideally suited to anyone working with traditional music and perfect for copying traditional music scores from sheet music.

More than that, however, the system can translate the music you produce on the stave into Ample's MCL in the Notepad. The Notepad brings you nearest to the Ample ideal. It is a screen-sized text editor which can be used to produce music or to create or edit instrument sounds.

Ample music notation is very simple. Notes are called by their usual names, A to G, and the duration and octave are determined by initial numeric settings. Upper case letters indicate a rise in pitch from the last note and lower case letters represent a fall in pitch.

Notes can be lengthened either by specifically increasing the duration or, more usually, by putting a slash character (/) after the note. Here's the first four bars of Good King Wenceslas:

```
24, 0: CCCD ccg/ AgAB C/C/
```

The first figure, followed by a comma, sets the beat length and the next figure, followed by a colon, sets the octave.

This notation is arguably easier to understand and more logical than traditional notation. It supports chords and the full range of accidentals, and because it is text-based it is fairly easy to manipulate notes and music with programming techniques such as loops.

This can lead you into an absolutely fascinating area of music, that of applying computer power to the composition process. It's not too difficult and I have produced several pieces of computerised music, some of which have been described as Tangerine Dream like.

Ample also provides elements that are not included in traditional staff notation, such as negative notes – going back in time for pickups – and strummed chords. It has built-in special effects, which can also be used on the stave, such as Echo which can be used to create reverb effects and true echoes. These can be detuned, transposed and panned across the stereo image.

Continuous changes in tempo and volume are very rare indeed in computer based music but they are standard fare in the Hybrid Music System. They can even be used to produce autopanning and slide effects.

You can edit words in the Notepad which were created in the Staff Editor and the Mixing Desk, and this is really the module on which the other modules hang.

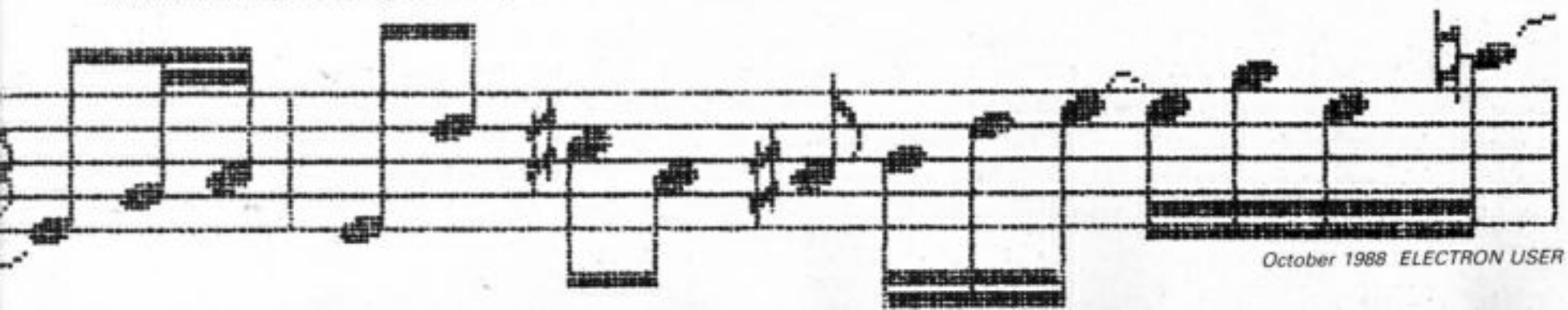
The Notepad is also where instruments are designed and edited. Switching to Panel Mode allows you to edit instrument characteristics by moving the cursor between different parts of the instrument's parameters. As in the Mixing Desk, selection of waveforms, for example, is made by holding down the Shift key and a list of options appear at the bottom of the screen.

You can choose from 14 waveforms, 17 amplitude envelopes and 17 pitch envelopes. You can add synchronisation and ring and frequency modulation, too.

A unique facility is the ability to design your own panels. You could call up an unmodulated piano sound and type in controls for frequency modulation, ring modulation and so on, in any spare area of the panel. The limited number of waveforms and envelopes is not as restricting as it may at first appear.

The ease of instrument creation helps offset any twinge of regret you may feel about not

Turn to Page 10 ▶



◀ *From Page 9*

having full programmability. It would be easy to add an additional waveform editing module to the system and rumour has it that one is currently under development.

The manual contains graphic displays of all the waveforms and envelopes, which are extremely helpful. The system loads with 14 preset instruments and the manual contains details of another 25 for you to type in. You'll get lots more from the demonstration pieces, too.

If you want to delve even deeper into the system watch out for the Programmer's Guide. A leaflet points out the two main functional differences between the Electron and BBC Micro versions of the system. As the Electron version runs in Mode 6 there is consequently less memory for program storage. Also, as the Electron has less processing power operation of controls and execution of programs is generally slower. This is most evident with programs requiring lots of processing, and the use of Echo can cause a hiccup or two as well.

However, the majority of BBC Micro Ample programs will be compatible with the Electron system, and Electron users can tap into a wide source of programs and assistance in the form of Ample user groups and bulletin boards.

Hybrid is looking at the compatibility of existing BBC Micro Ample music albums (on floppy disc) with the Electron system and will be supporting the Electron system with its own Ample albums. There are provisional plans to release a keyboard – the Music 4000 – which will allow users to play the system as a synthesiser and enter music into it in real time. There's also the possibility of linking with other units such as a Midi interface.

Hybrid has developed an amplifier called the Music 1000 with three headphone outputs which is ideal for use in the classroom. This is, of course, compatible with the Electron system.

Now at last Electron owners have a music system available for their computer. The combination of a synthesiser with programmable voices, stave editing, a mixing desk plus the computing power of the Ample language makes this system unique. There's really nothing to compare it with.

Not one other personal computer – other than the BBC Micro – has such a fully integrated music system. It has simply got to be one of the best and cheapest ways into computer music. If you want to hear it in action send for the demonstration cassette. You'll want one!

```
   Studio 5000 Main Menu     ID 108638
-----------------------------------------
  Run program
  Notepad
  Mixing Desk
  Staff Editor
  Ready system
  Load program
> Save program
  Catalogue
  New
  Commands
-----------------------------------------
 %SHOW
RUN          do          glock       mix
oursynth     part1       part2       part3
part4        tarimba     tink
11 words, no data
 %MEM
Words: 1534              Data: 0
System: 0                Arrays: 0
Free: 6835
 %
 %
 %
```

Studio 5000 Main Menu screen – the SHOW command lists user-defined words

Product: Hybrid Music System Music 5000 Synthesiser
Price: £113.85
Product: Demonstration Audio Cassette
Price: £2.95
Supplier: Hybrid Technology/Pres, 6 Ava House, High Street, Chobham, Surrey GU24 8LZ.
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electron user

ARCADE CORNER

Compiled by MARTIN REED

Why some pokes don't

I HAVE received a couple of letters saying that some of the pokes featured in previous columns do not work. Now when a poke is featured we always make sure that it actually works on an original version of the game.

However, there is often more than one version of a game – especially with so many being re-released on compilations – so we cannot guarantee that a poke will work on them all.

Don't be disappointed if it doesn't, but consider it a bonus if it does. Better still, why not try writing a routine that works with your particular version?

But please remember that your poke must apply to currently available versions of the game.

This month's pokes come from Brian Darroch from Ardrossan in Scotland, Jason Fisher from Rickmansworth, Herts, David Donaldson from Amersham, Bucks and Alistair Hammond from St. Helier, Jersey.

Share your hints, tips, pokes and cheats with fellow *Electron User* arcade addicts – but please ensure they are all your own work. Send them to:

Arcade Corner,
Electron User,
Adlington Park,
Adlington,
Macclesfield,
SK10 4NP

Gorilla high-score

***Killer Gorilla** – Micro Power*

Here is an interesting routine for this ever-popular game. It allows you to have your own personalised high-score table.

Load and run the game as normal, then when you have finished playing, press Break, put your own blank tape into the recorder, and type:

```
*SAVE SCORES 1020
+100 2B6F
```

When you want to play the game again, start off as usual and wait until the title screen and the GORILLA file have loaded. Then press Escape and type:

```
*LOAD ""
```

Press Play on the recorder and wait until the GORILLA2 file has loaded. Now put your blank tape into the recorder, type:

```
*RUN
```

and press Play. The game will now run with your own scores on the high-score table instead of the default ones.

Want to live for ever?

***Mr Wiz** – Superior*

This poke is for Mr Wiz in the Plus 3 disc version of the game in the Superior Collection Volume 3. To start, load Mr Wiz as normal, until the first page of instructions are displayed.

Press the spacebar to continue, then press Escape when the GAME file has loaded. Make sure that the error message given is *Escape*, not *Escape at line....* Now type:

```
121 ?&148A=x
```

where *x* is the required number of lives, less one – for instance, set *x* to nine if you want 10 lives.

Although any value up to 255 is acceptable, a value of 13 or higher will corrupt the screen.

For infinite lives, type:

```
230 REM
```

Now type RUN to start the game. Can anyone supply an equivalent routine for tape users?

While we're on the subject of Mr Wiz, Chris Dawkins has found that the level jump published in the November 1987 column does not work with his version of the game, but pressing the 1, Caps LK and Q keys simultaneously does the trick.

Chris's point reinforces my own at the beginning of this column – that there is often more than one version of the same game.

Boost Elite weapons

***Elite** – Acornsoft/ Superior*

Enter the following program then save it on a blank tape. Change the tape for another blank one and type RUN. This saves a special Commander under the name of CHEAT.

Load Elite as normal, then load this new Commander. You now have a very powerful weapons system and 200 million credits. This should be of help to David Wyeth who asks if I have any cheat routines for Elite.

While this one allows you to become virtually invincible with the minimum of effort, my own personal feeling is that Elite is best played without any modifications.

```
10 REM Elite Cheat
20 REM
30 REM (C) Electron User
40 REM
50 A%=OPENOUT("E.CHEAT")
60 FOR C%=0 TO &4B
70 READD$:D%=EVAL("&"+D$)
80 BPUT# A%,D%
90 NEXT C%
100 FOR C%=&4C TO &FF
110 BPUT# A%,0
120 NEXT C%
130 CLOSE# A%
140 DATA 00,14,AD,4A,5A,48,
02,53
150 DATA B7,77,35,94,00,FF,
84,00
160 DATA FF,FF,FF,FF,00,00,
FF,00
170 DATA 00,00,00,00,00,00,
00,00
180 DATA 00,00,00,00,00,00,
00,00
190 DATA 00,00,00,04,00,00,
00,00
200 DATA 00,00,00,03,00,10,
0F,11
210 DATA 00,03,1C,0E,00,00,
0A,00
220 DATA 11,3A,07,09,08,00,
00,00
230 DATA 00,40,7C,35
```

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electron user ARCADE CORNER

◄ From Page 11

Get Droid taped

***Codename Droid** – Superior*

Following the maps in the April and May 1988 issues of *Electron User*, and last month's Arcade Corner hints, here is a complete set of pokes for the tape version of Codename Droid – the original, not the Play It Again Sam II version. Enter the following listing as it is, then save it on one of your own blank tapes.

Each cheat feature is clearly labelled, so just delete the lines containing whichever pokes you don't want in that particular game, before typing RUN.

Position the original game tape just before the second DROID file – the one after RUN3 – as that is the only one necessary to play the game.

```
  10 REM Codename Droid Ch
eat
  20 REM by David Donaldso
n 1988
  30 REM (c) Electron User
  40 MODE 5:VDU 23,1,0;0;0
;0;:PROCload
  50 FOR I%=0 TO 2 STEP 2:
P%=&160:[OPT I%
  60 JSR &120
  70 LDA# &A5:STA &2718:\
infinite lives
  80 LDA# &EA:STA &29B9:ST
A &29BA:\ infinite mines
  90 LDA# &EA:STA &3842:ST
A &3843:\ infinite blaster
energy
 100 LDA# &A9:STA &2BD9:ST
A &2BDB:LDA# 0:STA &20A4:ST
A &2AFB:STA &3BB7:\ infinit
e suit energy
 110 LDA# &19:STA &11FF:\
infinite jet-pack energy
 120 LDA# &EA:STA &15DB:ST
A &15DC:\infinite passcards
 130 LDA# &EA:STA &2CAC:ST
A &2CAD:\ infinite energy c
ells
 140 JMP &15C
 150 ]:NEXT
 160 CALL &160
 170 END
 180 :
 190 DEFPROCload
 200 !&120=&208D47A9:!&124
=&8D01A902
 210 !&128=&0EA90221:!&12C
=&F42004A2
 220 !&130=&A03FA2FF:!&134
=&FFF72001
 230 !&138=&04A20DA9:!&13C
=&4CFFF44C
 240 !&140=&4F52442E:!&144
=&080D4449
 250 !&148=&98488A48:!&14C
=&03CAAD48
 260 !&150=&CA8DFE29:!&154
=&68A86803
 270 !&158=&602868AA:!&15C
=&2159004C
 280 ENDPROC
```

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Tel: 01-861 1166

GOLDEN electron GAME

SHARK is one of two new titles from Audiogenic, the first this year. The scenario is typical – the bad guys have invaded in force and you, Colonel Charles StJohn Sharkey, nicknamed Shark, are the only hope. Will you take on this dangerous mission to rid the world of enemy agents? Of course you will.

It turns out to be a multi-screen wargame very much in the mould of Superior Software's Striker's Run – you dash across the screen left to right blasting away at all and sundry, and when you near the edge the screen flicks to the next.

You can jump around the screen from object to object so that one moment you may be running along the ground, and the next precariously balanced edging along an iron girder.

There are a number of different sections : Jungle, barrack square, town streets and more. Each sector is immediately distinctive – in the jungle you can run along the ground and through clearings, and jump up on to giant blocks of tone and large tree branches.

In town you can leap from window ledge to window ledge, the roofs of houses and so on. Clever use of dithering – mixing the pixels of different colours to give the appearance of new colours – adds to the overall effect.

You certainly need to keep on the move and your finger on the trigger as an endless stream of foot soldiers bears down on you. Luckily, your machine gun makes short work of them. The trucks and helicopter gunships are far more robust, and consequently much more dangerous. The latter home in on you, dropping bombs all the time. The trucks drive at you while the occupants lob grenades.

You must shoot both the helicopters and trucks several times before they burst into flames, but the danger does not stop there – you now have to contend with an armed and understandably furious pilot or driver charging you on foot. Contact with anything that moves is fatal.

Some useful bonuses are on offer if you can get to them. Killing certain foot soldiers lets you retrieve their backpacks. Collect them to find a machine gun, extra lives, temporary invulnerability and so on.

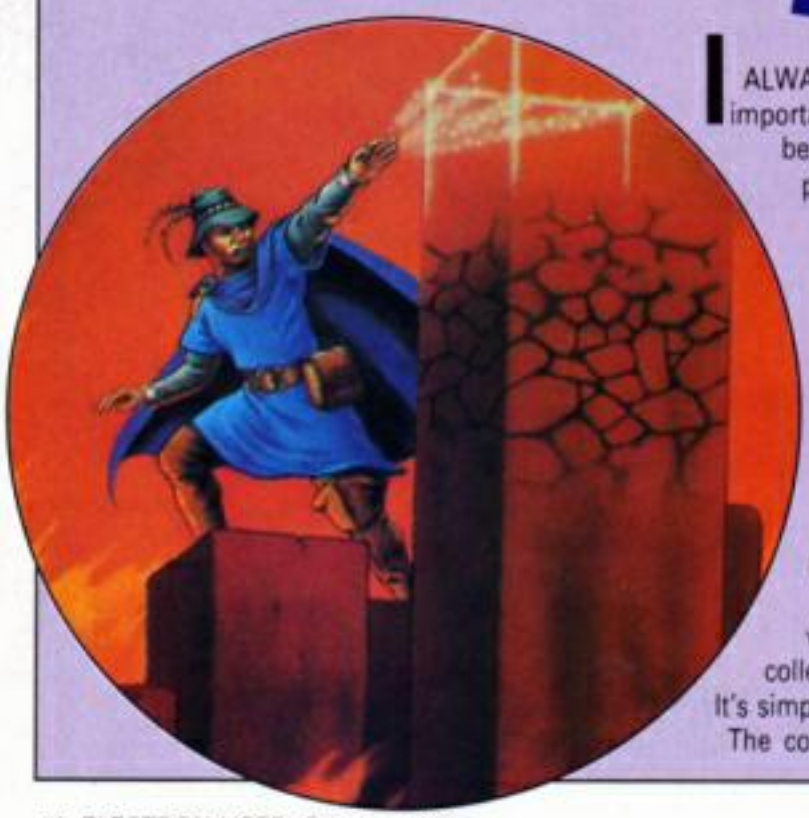
The game features some nice touches – the keys can be redefined and the colour schemes altered to make viewing easier if you are using a black and white TV or monochrome monitor. The

SecondOpinion

AT first I thought this was much too hard – just one hit by a stray bullet and you bite the dust. However, with practice I soon got the hang of it and was addicted in no time at all. If you're after a good blast you can't go far wrong with this little beauty.

Janice Murray

Reaching new levels



Product: Breakthrough
Price: £9.95
Supplier: ASL, Winchester House, Canning Road, Wealdstone, Harrow HA3 7SJ.
Tel: 01-861 1166

I ALWAYS think that playability is the most important virtue of any game. The sound may be poor and the graphics crude, but if it's playable I'll keep coming back for more. Also, with a few notable exceptions such as Elite, simple ideas often make the best games. Breakthrough from Audiogenic is one game that can be described in this way.

Although the title makes it sound like another Breakout bat and ball clone, Breakthrough is totally different. It is basically a 100 screen platform game in which you are a little wizard. Navigate your way around each screen avoiding the fireballs, vampire bats and various other nasties, collect a key and make your way to a door. It's simple – or is it?

The controls are certainly easy to use: Left, right, jump and create/destroy a block. It's this last feature that holds the key to the whole game. By destroying existing blocks and creating new ones you can change the shape of the screen by making doorways and staircases in which to gain access to unreachable nooks and crannies.

Certain types of block can't be destroyed and these are invariably positioned awkwardly just to make things difficult. When used in conjunction with fireballs and the other nasties they can produce some very tricky screens. However, there are certain compensations: Some blocks contain hidden goodies that can give you bonus

BLASTING

pause/restart, quit, and sound on/off options are all present and correct.

One drawback lets the game down, and that's the lack of accuracy when detecting collisions. Many a time I have sidestepped an enemy soldier or seen a bomb land well short of me only to find myself disappearing in a puff of red smoke. It is an irritating flaw in an otherwise highly enjoyable game. However, you do get used to it and it's not that much of a problem – just give everything a fairly wide berth.

The screen display is excellent and the Mode 2 – unusual for the Electron – multicolour graphics are well defined, although there is a strip of garbage along the bottom of the screen like Superior's Citadel and one or two other games. You won't notice it after a while.

The speed is excellent too, making it a fast-paced and exciting game to play. There's no music, but the sound effects are reasonably good with a rat-a-tat when you fire your gun, and a wheeee... when a bomb or grenade heads your way.

Shark is a simple and bracing shoot-anything-that-moves-before-it-gets-you type of game. Colonel Sharkey will certainly win his share of devotees, especially among those seeking a hero to inherit the mantle of Commander Striker.

Martin Reed

Sound	*8*
Graphics	*10*
Playability	*10*
Value for money	*9*
Overall	*9*

points, extra lives, or half the speed of the countdown timer. Very useful.

The 100 screens are not linked, as in an arcade adventure. They are separate, but in order of difficulty, and a useful screen skipping facility is provided so you don't have to start at the beginning each time. Every five screens you are given a new password which can be used to skip screens you have already mastered.

This is certainly an engrossing game, and is extremely addictive because of its simplicity. The graphics are rather small compared to those used in many other games on the market these days, and there is a strip of garbage across the top of the screen, but don't let that put you off – it's a great game.

There isn't any sound to speak of, just the odd effect here and there, and it runs fairly slowly, but this isn't a problem. In fact it positively helps, as I found it unplayable with my Slogger Turbo switched on.

Breakthrough is not too hard and strikes me as being an effective way to encourage children to think logically – there are certainly enough puzzles to ponder. If you are after something a little out of the ordinary, this could be right up your street.

Martin Reed

Sound	*3*
Graphics	*7*
Playability	*9*
Value for money	*8*
Overall	*8*

The loading screen

Try to reach the key in the corner

SecondOpinion

THIS is great for puzzle fanatics. The graphics are good and the screens are well thought out. The first presented no problems and took all of five minutes, but they get progressively more difficult. It's nice to play a non-violent game for a change. I think I'll just have one more go and see if I can crack screen 11.

Janice Murray

Jungle struggle

Program: Plane Crash
Price: £3.95
Supplier: Labyrinth Software, 22 Nelson Street, Retford, Nottinghamshire DN22 6LP
Tel: 0777 701669

PLANE Crash is the first release from this new software house dedicated to producing top rate adventures for the Electron and BBC Micro. In this three-part undertaking you have the misfortune to play the only survivor of a plane which crashed in a jungle. Your task is to first escape from the wreckage and then survive the rigours of your environment.

The brutal beginning may have a few adventurers squirming – you find yourself trapped in your seat viewing the severed head of the air stewardess. You have to extricate yourself from your jammed seat belt before flames and smoke engulf you.

At this point a move counter is operating, so actions must be decisive. Life is never easy and you will need to have a knowledge of schoolboy Latin or a good English dictionary if you are to be successful.

Once free you must explore the cabin thoroughly and act quickly to avoid suffocation. The fire extinguisher must be saved as it will prove invaluable on more than one other occasion.

SecondOpinion

Adventure games aren't really my cup of tea. However, fans will find this an interesting fantasy. There are puzzles galore designed to give the old grey matter a thorough workout, and lots of atmosphereic descriptions. The one or two minor bugs, don't really spoil the adventure, so it's worth a try.

Janice Murray

I have come across few adventures with as difficult a beginning as Plane Crash. Any mistake seems to result in an early transportation from the game to that great silicon paradise in the sky. Such difficulties may deter some beginners to adventuring, especially as Labyrinth discourages the user from asking for help.

As the game progresses you should LOOK at every opportunity and examine all you come across. In turn, open and look inside any artifacts, such as the box and the survival kit. Do not shy away from looting corpses – there are some weird studies in bad taste. The program does not recognise the word SEARCH, which I found irritating.

There are a few other annoyances which should have been ironed out by a team of play testers. On occasions flags are poorly set within the game and this leads to unnecessary frustration. For example, try taking the bag before

Above par simulation

Product: Golf
Price: £1.99
Supplier: Blue Ribbon, CDS House, Beckett Road, Doncaster DN2 4AD.
Tel: 0302 21134

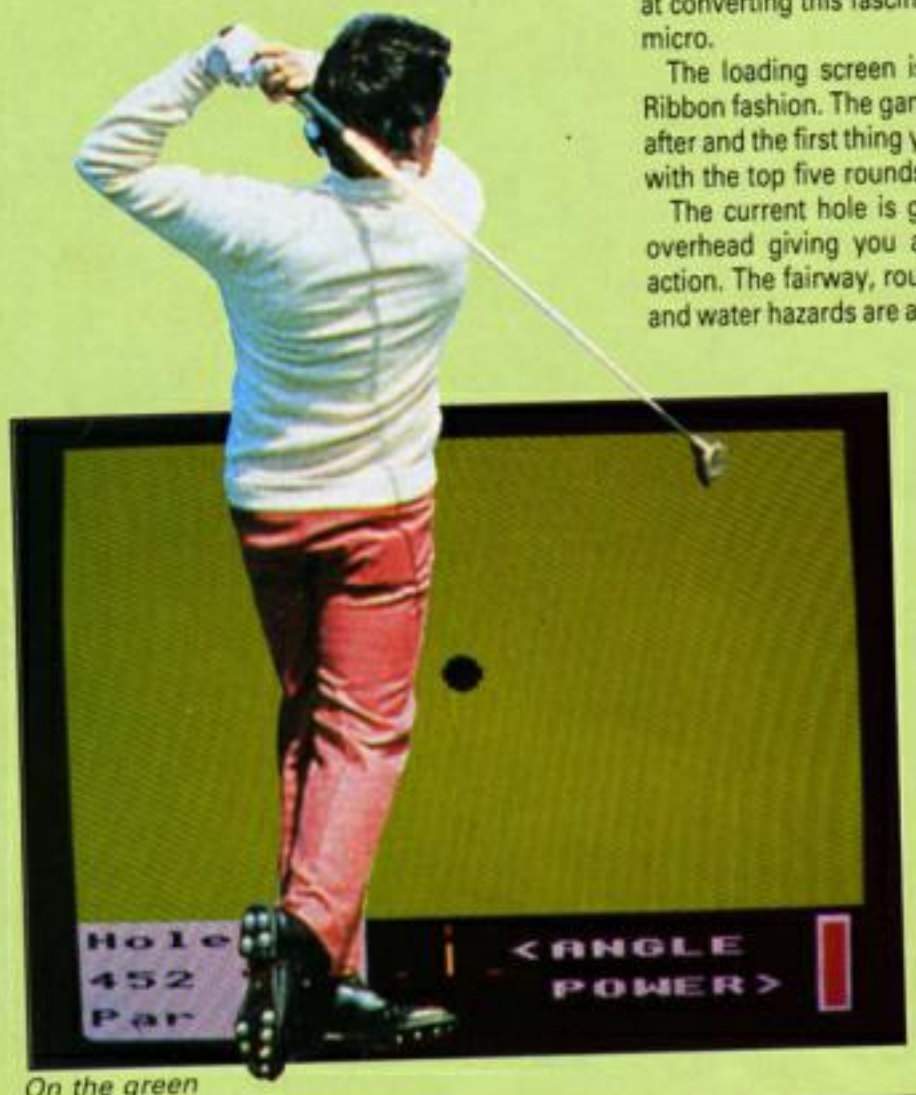
GOLF is another of those popular spectator sports which occupy vast amounts of television time, and it's a game which you either love or hate. This simulation, brought to you by Blue Ribbon, is one of the better attempts I have seen at converting this fascinating game of skill to the micro.

The loading screen is simple, in typical Blue Ribbon fashion. The game loads reasonably soon after and the first thing you see is the leaderboard with the top five rounds.

The current hole is graphically depicted from overhead giving you a bird's eye view of the action. The fairway, rough, green, trees, bunkers and water hazards are all shown. A flag marks the hole and the tee. Additional information provided is the distance to the green, the par for the hole and the wind direction.

First you select your club from a bag containing four woods, nine irons and a sand wedge. There's no indication of how far these will carry the ball, so the first few holes will be down to trial and error.

After selecting your club you are required to enter the direction and power of the shot. The direction is shown as a pointer which you can rotate left and right using Z and X, while the power is increased and decreased with the up and down cursor keys. Return hits the ball. You are told where it landed – on the fairway, in the



On the green

A bird's eye view of the hole

you have LOOKed.

I have long groaned at having to type GO DOOR in order to progress in an adventure. I also found the absence of the facility to GET or DROP EVERYTHING hampered progress unnecessarily. However, the storyline is well constructed, the problems are difficult but logical and screen response is very fast.

I loved the clever addition of having to monitor your blood sugar count, which was essential to survival. Eat and drink at every opportunity, don't relax, and providing you can endure the blackness of the jungle night you will be well on the way to success.

Despite my reservations, I enjoyed this adventure and will await the next Labyrinth game with interest.

Pendragon

Presentation	*7*
Atmosphere	*7*
Frustration factor	*10*
Value for money	*8*
Overall	*7*

rough, water and so on. You are prompted for more shots until you are on the green.

The screen then clears and you are presented with a magnified view of the green showing the hole and your ball. Additionally you are told whether the green is fast or slow so you can adjust the power of your shot accordingly. The club, a putter, is chosen automatically.

When you've finally holed the putt your score card is shown. Here you can see each hole played, how many shots you took, the par for the hole and distance. Also your overall score is displayed. Then it's on to the next hole, and so it continues for the rest of the course.

The graphics are reasonably good and the gameplay is interesting enough to prevent the game from becoming too tedious. The only feature I would have liked to see is a multi-player option, or a two player game at least.

I quite liked this simulation, though if you're not a golf fanatic it may not hold the same appeal. As a budget buy it can't be bad.

Roland Waddilove

Sound	*4*
Graphics	*7*
Playability	*7*
Value for money	*8*
Overall	*7*

SecondOpinion

Budding golf stars will love this simulation of that classic game. Everything has been well thought out, including water and sand hazards, trees and bushes and strong cross winds. A multi-player function is sadly missing, but even as a one player game it is quite a challenge, and it's a game that won't break the bank either.

Janice Murray

One hundred and eighty!

Product: Darts
Price: £1.99
Supplier: Blue Ribbon, CDS House, Beckett Road, Doncaster DN2 4AD.
Tel: 0302 21134

JUDGING by the amount of prime time television devoted to darts, it must be one of the most popular sports around – at least with the armchair athlete brigade. I prefer to get up and have a bash rather than sit and watch, so it was with some enthusiasm than I tackled Blue Ribbon's latest budget release, titled simply, Darts.

The loading screen is plain, but I'm not grumbling as there is nothing more irratating than waiting for a 20k title screen to load. After this comes a short program containing instructions, which is essentially the same as that supplied on the cassette insert. The main game is then loaded.

First comes a menu from which you can choose three different types of game, all played on the dartboard. The first is 501 – the one so popular on television. Both players enter their names followed by the score they wish to start on – there is no need to start on 501, and anything up to 1001 is possible. All games are two player and I was disappointed to find that there's no option to play against the computer.

In 501 each player takes it in turn to throw his darts and his score is subtracted from his total. The object is to reduce your total until you can throw a double to zero it.

The screen displays a large dartboard with scores down each side, and you use the Z, X, * and ? keys to position your erratically moving dart as best you can. Holding down the spacebar releases it.

The second game is Round the Board, involving throwing a dart at each number, followed by the outer then inner bull. You can make it harder by specifying that the doubles or trebles only must be hit.

The third game, my favourite, is cricket. Each player takes it in turn to throw as usual, but this time one is batting and the other bowling. The batter scores as many as possible, while the bowler tries for an outer or inner bull. The outer counts as one wicket, and the inner three.

The innings is over when 10 or more wickets have fallen; the players then swap batting and bowling. The winner is the one with the most runs.

The graphics are simple, with a board shown head on with the darts as crosses. The throwing action is again simply executed with a randomly moving dart which you can control to some degree by four keys. Throwing just fixes the dart at its current position. There's no sound to speak of, just a few notes played when you win the game.

For a budget title it's OK, but nothing to write home about. I found it quite interesting at first, but it soon became tedious, despite the three different games.

Roland Waddilove

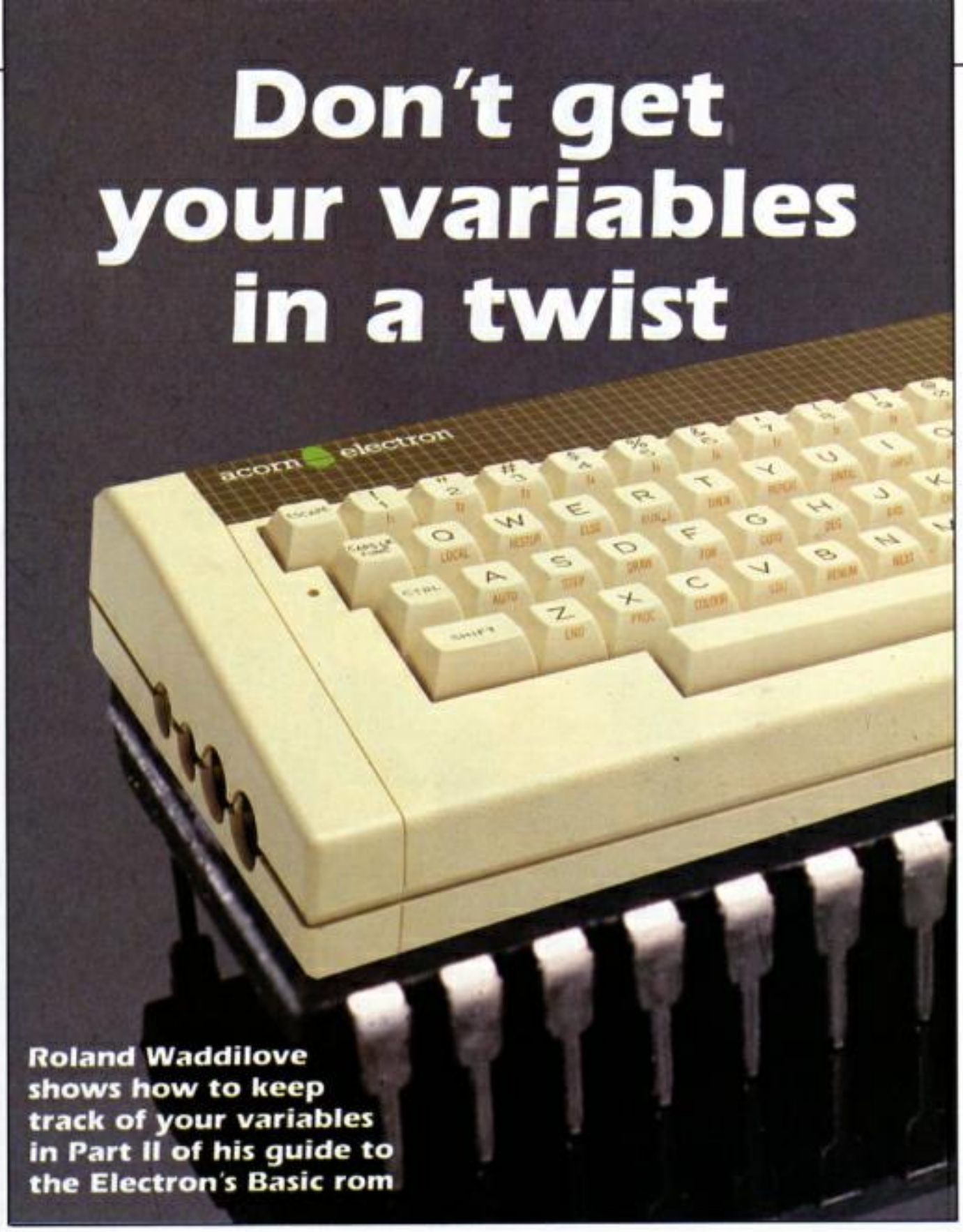
Sound	*3*
Graphics	*6*
Playability	*6*
Value for money	*7*
Overall	*6*

SecondOpinion

I love pub games like darts, and this offering from Blue Ribbon is a good simulation – though not quite up to the standard of Tynesoft's Indoor Sports. The graphics are good, and the variety of games played on the dartboard adds interest to what might otherwise be a dull simulation. At a budget price you can't complain.

Janice Murray

Don't get your variables in a twist



Roland Waddilove shows how to keep track of your variables in Part II of his guide to the Electron's Basic rom

THE Electron's Basic rom contains hundreds of useful subroutines which the machine code programmer can use in his own programs. In this series of articles I'll be documenting a few of them, and showing how they may be incorporated in your own listings.

Some routines have immediately obvious uses, others not. However, it is interesting to see how BBC Basic goes about its business, and having a more thorough knowledge of what goes on under the lid of your micro will enable you to use it more efficiently.

Last month we examined the routines Basic uses when listing programs in memory, and developed one of our own. Now we'll take a brief look at variables, see how Basic creates them, and later find where they are stored when it wants to access them.

Basic stores any variables that a program uses on a structure called the heap, an area of memory starting at LOMEM. When a program is run and before any variables have been defined, the heap is empty and the top of this section of memory – pointed to by memory locations &02/&03 – is at the same address as the end – LOMEM, pointed to by locations &00/&01. If Basic encounters a numeric variable defined within the program it is running it stores its name and value on the top of the heap and moves its heap pointer up to the next free location, ready for the next variable. So the heap grows upwards in memory starting at LOMEM.

When Basic comes across a line like:

```
PRINT length * 2
```

it must search for the variable *length* so that it can multiply it by two and print out the result.

If Basic had to look through every item on the heap for a variable with the name *length* it would take quite a long time, and programs would be slowed down drastically by large numbers of variables. Foreseeing this problem, the author of BBC Basic, Roger Wilson, has implemented a linked list structure for the variable heap. What this means is that the variables are linked like chains, and to find a particular variable Basic looks along the links of a particular chain until it finds it.

Part of page four – &400 – in memory is dedicated to this linked list. It works like this: If Basic encounters a variable whose name starts with the letter A it puts the name and value on the

Routine	Input parameters	Output parameters
fncvra=&9582 find/create variable	PTRA points to variable name	Z=0 – variable found
		Z=1 – variable not found so new one created
schvar=&9479 search for variable	&37/&38 points to one before name &39=length	Z=1 – variable not found
		Z=0 – &2A/&2B points to variable value

The rom routines used

Resident integer variables

Using the heap as a scratchpad to store variables does not apply to any of the resident integer variables A%-Z% and @%. Basic has set aside a block of memory starting at &400 for these permanently defined variables.

This makes them easy to find, since Basic already knows where they are located and doesn't waste time searching the heap for them. As their location is already known, they can be accessed much faster than ordinary numeric variables. Also maths operations using them are much quicker because integer maths is so quick and easy to perform.

stack and stores its address at &482/&483. If it then comes across another variable starting with the letter A it again stores its name and number on the stack, but in addition, stores its address with the first variable it found.

So the memory location &482/&483 holds the address of the first variable beginning with the letter A – or zero if there aren't any – and this variable holds the address of the next variable starting with A, which stores the next and so on. The same thing happens with the variables starting with B, and C and so on. Their addresses are stored at &484/&485, &486/&487 and so on.

As you can see, a linked list or chain of variables is formed, with each one pointing to the next starting with the same letter. If a pointer is zero there aren't any more variables starting with that letter.

To find the start of a chain, Basic takes the Ascii value of the letter, doubles it and adds &400. So if it wants to find the value of the variable *width* it gets the pointer to the variable chain starting with the letter w at &400+2*ASC"w" and follows the w chain.

A side effect of this is that if we use variables starting with a different letter of the alphabet in our programs, Basic will instantly be able to find their location and access them much quicker than would normally be possible. Even if two or three variables start with the same initial letter there will still only be two or three variables to search through.

One thing I haven't mentioned, is that Basic doesn't store the first letter of the variable name – it doesn't need to as each variable is in a linked list and they all start with the same letter.

Program I is a short procedure which will print out the names of all the variables defined within a program. To use it in your own programs add the procedure PROCprint_variables to the end of your listing. After running your program enter:

```
PROCprint_variables
```

Program II shows how Basic searches for a variable, and makes use of a subroutine called *schvar* at &9469. When calling this, set &37/&38 to one before the start of the variable name and set &39 to the length. On return, if the zero flag is clear then &2A/&2B points to the address of its value.

In this example we are searching for the variable called *temp%*, which is stored in line 220. When found – it's defined in the program in line 40 – its address and value are printed. Try changing the variable searched for in line 220 to *fred* and confirm that a *Not found* error message is printed.

Program III is a slight variation on the last one, and this time, if after searching for a variable it is not found, a new one is created and its value set to zero.

It uses a subroutine called *fncvra* at &9582 which searches for the variable at PTRA. If found it it will return with the zero flag clear, PTRA pointing to the character after the name, and IntA holding the variable descriptor block. The first two bytes hold the address of the value and the third holds the variable type. If the variable isn't found a new one is created on the heap and its value is set to zero.

● *Next month I'll be looking at some more useful Basic rom routines and taking Basic apart to see what makes it tick.*

```
   10 REM Print Variables by
   20 REM scanning linked list
   30
   40 PROCprint_variables
   50 END
   60
 9000 DEF PROCprint_variables
 9010 FOR letter=ASC"A" TO ASC"z"
 9020 link=&400+letter*2
 9030 link=!link AND &FFFF
 9040 IF link<256 GOTO 9100
 9050 VDU letter
 9060 temp=link+2
 9070 IF ?temp VDU ?temp:temp=temp+1:G
OTO 9070
 9080 PRINT
 9090 GOTO9030
 9100 NEXT
 9110 ENDPROC
```

Program I

```
  10 REM Search for variable
  20 REM By R.A.Waddilove
  30 REM (c) Electron User
  40 temp%=70
  50 schvar=&9469
  60 FOR i=0 TO 2 STEP 2
  70 P%=&900
  80 [ OPT i
  90 LDA #(var-1)MOD 256
 100 STA &37
 110 LDA #(var-1)DIV 256
 120 STA &38
 130 LDA #len-var
 140 STA &39
 150 JSR schvar
 160 BEQ not_found
 170 LDA &2A:STA &70
 180 LDA &2B:STA &71
 190 RTS
 200
 210 .var
 220 EQUS "temp%"
 230 .len
 240
 250 .not_found
 260 BRK
 270 EQUB 0
 280 EQUS "Not found"
 290 BRK
 300 ]
 310 NEXT
 320 CALL &900
 330 PRINT "Address=&";~!&70 AND &FFFF
 340 PRINT "Value=";!(!&70 AND &FFFF)
```

Program II

```
  10 REM Find/create variable
  20 REM By R.A.Waddilove
  30 REM (c) Electron User
  40 osasci=&FFE3
  50 fncvra=&95C9
  60 PTRA=&B
  70 PTRAindex=&A
  80 PTRB=&19
  90 PTRBindex=&1B
 100 FOR i=0 TO 2 STEP 2
 110 P%=&900
 120 [OPT i
 130 LDA PTRA:PHA
 140 LDA PTRA+1:PHA
 150 LDA PTRAindex:PHA
 160 LDA PTRB:PHA
 170 LDA PTRB+1:PHA
 180 LDA PTRBindex:PHA
 190
 200 LDA #var MOD 256
 210 STA PTRA
 220 LDA #var DIV 256
 230 STA PTRA+1
 240 LDY #0
 250 STY PTRAindex
 260 JSR fncvra
 270 BEQ new
 280 JSR print
 290 EQUS "Variable exists"
 300 EQUW 13
 310 JMP exit
 320 .new
 330 JSR print
 340 EQUS "New variable"
 350 EQUW 13
 360
 370 .exit
 380 PLA:STA PTRBindex
 390 PLA:STA PTRB+1
 400 PLA:STA PTRB
 410 PLA:STA PTRAindex
 420 PLA:STA PTRA+1
 430 PLA:STA PTRA
 440 RTS
 450
 460 .print
 470 PLA:STA &70
 480 PLA:STA &71
 490 LDY #0
 500 BEQ here
 510 .loop
 520 LDA (&70),Y
 530 BEQ end_print
 540 JSR osasci
 550 .here
 560 INC &70:BNE loop
 570 INC &71:BNE loop
 580 .end_print
 590 LDA &71:PHA
 600 LDA &70:PHA
 610 RTS
 620
 630 .var
 640 EQUS "Total=0"
 650 ]
 660 NEXT
 670 CALL &900
```

Program III

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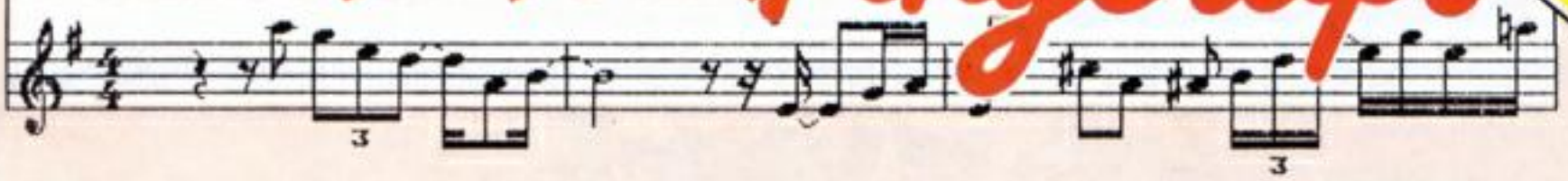

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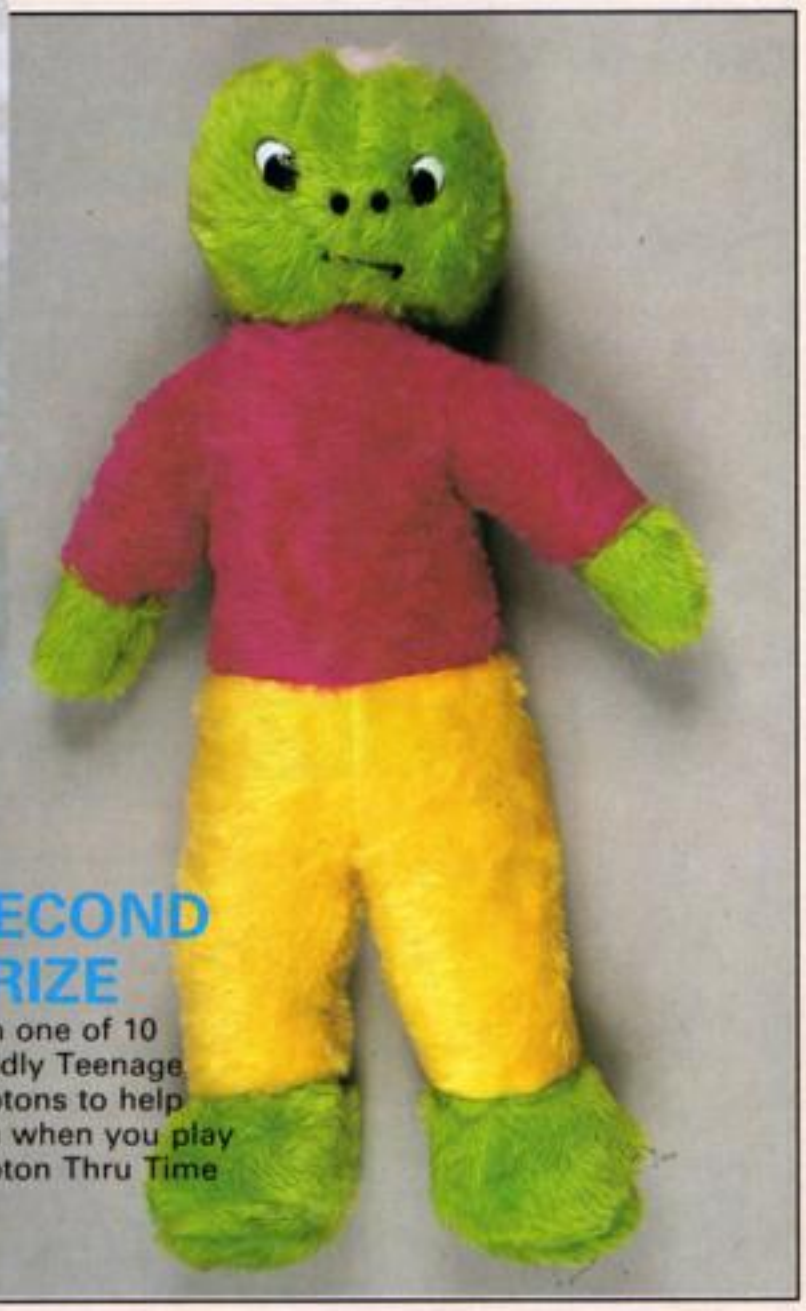

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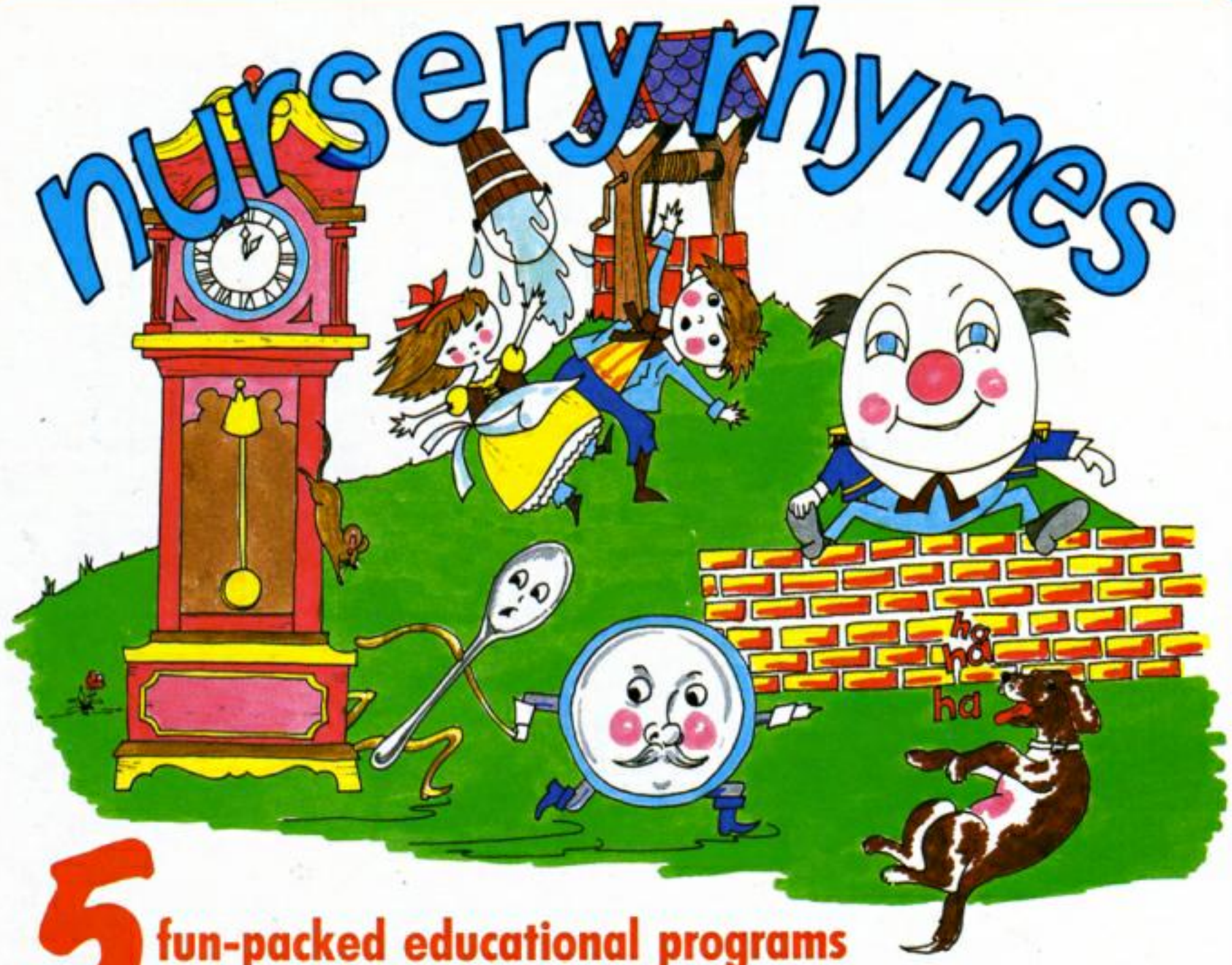
nursery rhymes



5 fun-packed educational programs . . . for young children everywhere

This delightful collection of programs is based around children's favourite Nursery Rhymes. There's plenty of sparkling colour, sound and captivating animation to keep them riveted – and as they play they'll be learning all the way.

- ★ Tell the time with Hickory Dickory Dock.
- ★ Assemble the jigsaw in Humpty Dumpty.
- ★ Learn to spell with Jack and Jill.
- ★ Match the animals in See Saw Marjory Daw.
- ★ Play an exciting game in Hey Diddle Diddle.

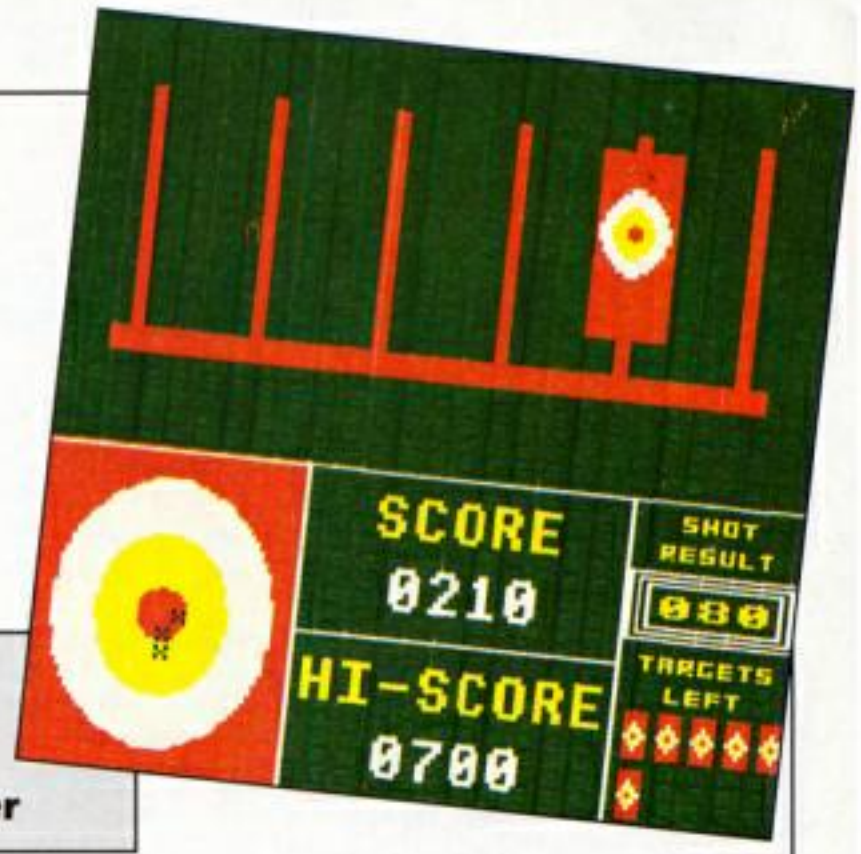
Children from two to nine will be entertained for hours with these interactive programs. Don't miss out on this beautiful gift for your family – and at a very special price.

ONLY £5.95 (cassette)
£6.95 (3½" disc)

Suitable for any Acorn Electron

TO ORDER PLEASE USE THE FORM ON PAGE 45

Do you feel lucky, punk?



LOAD your Electron and try your hand at pistol shooting. This fast-action game will sharpen your reflexes and get your adrenalin flowing and your heart pumping.

David Taylor's game for budding marksmen will provide the answer

The top half of the screen contains six targets, edge-on so they can't be seen. At random intervals one will swing round and you must quickly move your sights to it, position them carefully and fire your gun. If you are too slow the target will swing back and you'll lose your shot.

There are 10 targets in all and the bottom left hand corner of the screen shows a greatly magnified picture of one. On this is recorded where each bullet hits. The outer white ring is worth 20 points, the middle yellow ring 50 points, the inner red 80 and if you hit the target dead centre you'll chalk up 100 points.

The score for each individual shot is displayed in the bottom right-hand corner of the screen, along with the number of targets remaining. A running total of your score is shown in the middle, just above the current high score. You can use a Plus 1 and analogue joystick or the keys Z, X, * and ? for up down left and right, plus Return for fire.

How good is your aim? Are your reactions fast enough? Find out by playing Pistol Shooting.

```
   10 REM PISTOL SHOOTING
   20 REM By David Taylor
   30 REM By (c) Electron User
   40 MODE5
   50 VDU23,224,0,4,4,4,31,4,4,4
   60 VDU23,225,1,1,7,7,15,15,30,30
   70 VDU23,226,192,192,240,240,248,24
8,60,60
   80 VDU23,227,60,56,56,56,112,112,11
2,112
   90 VDU23,228,30,14,14,14,7,7,7,7
  100 VDU23,229,112,112,56,56,56,60,30
,30
  110 VDU23,230,7,7,14,14,14,30,60,60
  120 VDU23,231,15,15,7,7,1,1,0,0
  130 VDU23,232,248,248,240,240,192,19
2,0,0
  140 VDU23,233,0,0,56,56,124,254,254,
254
  150 VDU23,234,15,14,14,14,14,15,7,7
  160 VDU23,235,120,56,56,56,56,120,24
0,240
  170 VDU23,236,254,124,56,56,0,0,0,0
  180 VDU23,237,0,0,0,5,5,2,5,5
  190 VDU23,238,80,80,136,136,80,80,32
,32
  200 VDU23,239,0,0,0,0,0,0,32,32
  210 VDU23,240,32,32,80,80,32,32,0,0
  220 VDU23,241,0,0,32,32,0,0,0,0
  230 VDU23,242,248,248,248,248,248,24
8,248,248
  240 VDU23,243,0,0,0,238,74,78,74,74
  250 VDU23,244,0,0,0,238,168,232,202,
174
  260 VDU23,245,0,0,0,238,132,228,132,
228
  270 VDU23,246,0,0,0,224,128,224,32,2
24
  280 VDU23,247,0,0,0,142,136,142,136,
238
  290 VDU23,248,0,0,0,238,132,228,132,
132
  300 VDU23,249,0,0,0,234,138,238,42,2
34
  310 VDU23,250,0,0,0,238,164,164,164,
228
  320 VDU23,251,0,0,0,238,168,238,200,
174
  330 VDU23,1,0;0;0;0:S%=0:HS%=700:H$=
"0700":LW=100:DIMNM$(10):RESTORE1690:F
ORA%=1TO5:READNM$(A%):NEXTA%
  340 VDU4:PROCintro:COLOUR128:CLS
  350 VDU23,252,0,0,0,234,138,234,42,2
38
  360 VDU23,253,0,0,0,142,132,132,132,
228
  370 ENVELOPE1,131,0,0,0,0,0,0,126,-3
,0,0,126,0
  380 S$="0000":S1$="000"
  390 IF S%>HS% HS%=S%:HS$=STR$(HS%):L
%=LEN(HS$):H$=STRING$(4-L%,"0")+HS$
  400 S%=0:ED=0
  410 PROCScreen
  420 F%=0:H%=0:X%=592:Y%=504:S=0
  430 IF ED=1 ED=0:MSG$="GAME OVER":FO
RA=0 TO 500:NEXTA:FOR A%=1 TO 9:MOVE28
8+(64*A%),800:PROCbig(MID$(MSG$,A%,1))
:SOUND1,-15,45-(A%*5),2:FORB=0TO150:NE
XTB:NEXTA%:FORA=0TO5000:NEXTA:GOTO340
  440 VDU5:PROCTarget(1)
  450 IF M%=1 PROCJoy:GOTO 530
  460 IF INKEY-98 X%=X%-8
  470 IF INKEY-67 X%=X%+8
  480 IF INKEY-73 Y%=Y%+8
  490 IF INKEY-105 Y%=Y%-8
  500 MOVEX%,Y%:PRINTCHR$(224)
  510 IF F%=1 THEN 530
  520 IF INKEY-74 F%=1:PROCFire
  530 IF TIME>=350 PROCTarget(2):GOTO
420
  540 MOVEX%,Y%:PRINTCHR$(224)
  550 IF X%>=1192 X%=1192
  560 IF X%<=0 X%=0
  570 IF Y%>=1000 Y%=1000
  580 IF Y%<=488Y%=488
  590 GOTO 450
  600 END
  610 DEFPROCScreen
  620 GCOL0,129:FOR A%=1 TO 6:VDU24,(A
%*200)-80;598;((A%*200)+16)-80;918;:CL
G:NEXT A%
  630 VDU24,90;568;1168;598;:CLG:VDU24
,0;0;440;440;:CLG:VDU26
  640 GCOL0,3:MOVE0,0:DRAW1279,0:DRAW1
279,1023:DRAW0,1023:DRAW0,0:MOVE440,0:
DRAW440,440:MOVE0,440:DRAW1279,440:MOV
E440,220:DRAW976,220:MOVE976,0:DRAW976
,440
  650 VDU5:MOVE552,408:GCOL0,2:PROCbig
("SCORE"):MOVE584,312:GCOL0,3:PROCbig(
S$):MOVE456,184:GCOL0,2:PROCbig("HI-SC
ORE"):MOVE588,88:GCOL0,3:PROCbig(H$)
  660 GCOL0,2:MOVE1064,432:PRINTCHR$24
9;CHR$250:MOVE1032,392:PRINTCHR$251;CH
R$252;CHR$253
  670 GCOL0,3:FOR A%=0 TO 16 STEP 8:MO
VE984+(A%*2),256+A%:DRAW1271-(A%*2),25
6+A%:DRAW1271-(A%*2),344-A%:DRAW984+(A
%*2),344-A%:DRAW984+(A%*2),256+A%:NEXT
 A%:GCOL0,2:MOVE1032,312:PRINTS1$
  680 MOVE1016,244:PRINTCHR$243;CHR$24
4;CHR$245;CHR$246:MOVE1064,204:PRINTCH
R$247;CHR$248
  690 U%=136:FOR L=1 TO 2:FOR Q%=1000
TO 1224 STEP 56:GCOL0,1:MOVEQ%,U%-12:P
RINTCHR$242:MOVEQ%,U%+20:PRINTCHR$242:
GCOL0,3:MOVEQ%,U%:PRINTCHR$238:MOVEQ%,
U%+32:PRINTCHR$239:GCOL0,2:MOVEQ%,U%:P
RINTCHR$240:GCOL0,1:MOVEQ%,U%
  700 PRINTCHR$241:NEXT Q%:U%=U%-80:NE
XT L:VDU4:U%=U%+80:Q%=Q%-56
  710 PROCcloseup
  720 ENDPROC
  730 DEFPROCTarget(P%)
  740 IF P%=2 THEN 840
  750 IF P%>2 ENDPROC
  760 GCOL3,3:MOVEX%,Y%:PRINTCHR$(224)
  770 TIME=0:REPEAT UNTIL TIME>=100+RN
D(5000)
  780 E%=RND(6)
  790 GCOL0,1:TIME=0:FOR A%=28 TO 76 S
TEP 8:MOVE((E%*200)-80)+A%,648:DRAW((E
%*200)-80)+A%,898:MOVE(((E%*200)+16)-A
%)-72,648:DRAW(((E%*200)+16)-A%)-72,89
8:SOUND1,-15,A%*3,1:NEXT A%
  800 GCOL0,3:MOVE(E%*200)-136,848:PRI
NTCHR$225;CHR$226:MOVE(E%*200)-136,816
:PRINTCHR$227;CHR$228:MOVE(E%*200)-136
,784:PRINTCHR$229;CHR$230:MOVE(E%*200)
-136,752:PRINTCHR$231;CHR$232
  810 GCOL0,2:MOVE(E%*200)-96,832:PRIN
TCHR$233:MOVE(E%*200)-136,800:PRINTCHR
$234;CHR$235:MOVE(E%*200)-96,768:PRINT
CHR$236
  820 VDU26
```

Turn to Page 25 ▶

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Write your own arcade smashes using

ARCADE GAME CREATOR

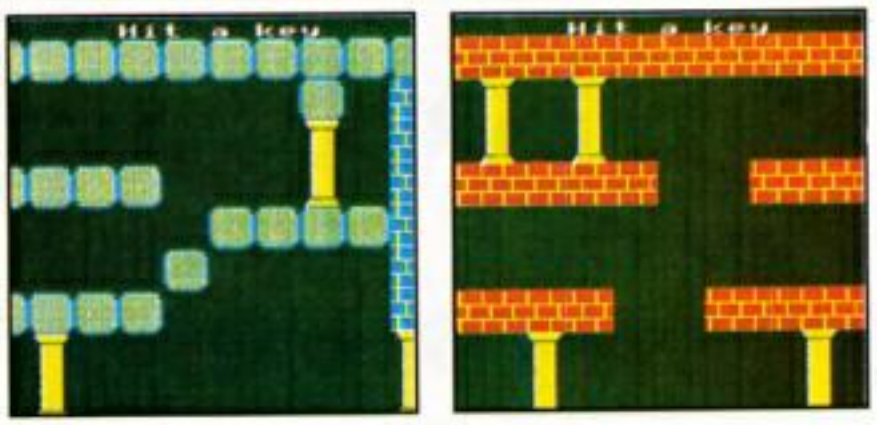
Arcade Game Creator is a suite of programs taken from the pages of *Electron User*. It lets you into the secrets of writing fast-action arcade games, and provides you with a number of utilities to make design and programming easier.

Among the programs are:

- A Mode 5 sprite editor for designing your own multi-colured characters.
- A selection of fast print routines that will move sprites both in front or behind other objects on the screen.
- Map generators that will squeeze a Mode 5 screen into 8 bytes!
- Scrolling maps.
- Score update and printing routines.

. . . and much, much more.

To accompany the Arcade Game Creator we are also making available the six back issues (February to July 1988) in which the series appeared, in a special bundle for only £8.99 – saving over £1.50. The series of articles is clearly written without any jargon, and takes you step-by-step from the basics of game design, right up to producing fully-fledged programs.



Two simple screens from the series

If you are an aspiring games programmer, this is an offer you simply cannot afford to miss!

Arcade Game Creator	Six issues of Electron User containing details of the package	Tape and bundle £12.94 Disc and bundle £13.94
Tape £3.95 Disc £4.95	£8.99	**SAVE OVER £1.50**

To place your order, please turn to the form on Page 45

Two great offers from electron user

SAVE UP TO £31!

Get electron user FREE each month

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Incredible but true! For a limited period we are now giving away *Electron User* for a whole year – when you take out a tape or disc subscription. That's worth £15! You'll also be able to choose from the special subscription offer on Page 45 – and save an additional £15.

Each of the monthly tapes and discs is packed with all the fun-filled games and power-packed utilities from the pages of *Electron User,* plus occasional extras which you won't find in the magazine.

Remember, this offer is for a limited period only, so save the wear and tear on your fingers, and ensure you get programs that work the first time, by taking us up on this special offer, *today!*

Note: If you don't wish to subscribe to the magazine, you can still take out a tape or disc subscription at a saving of £10! Or, if you are already a subscriber, you may renew your subscription early to take advantage of this exceptional offer.

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Special price	*£40*	*Special price*	*£50*
YOU SAVE	**£10**	**YOU SAVE**	**£15**

Place your order TODAY, using the form on Page 45

CONTROLS	
Z	Left
X	Right
*	up
?	down
Return	Fire
Or	Joystick

◀ *From Page 23*

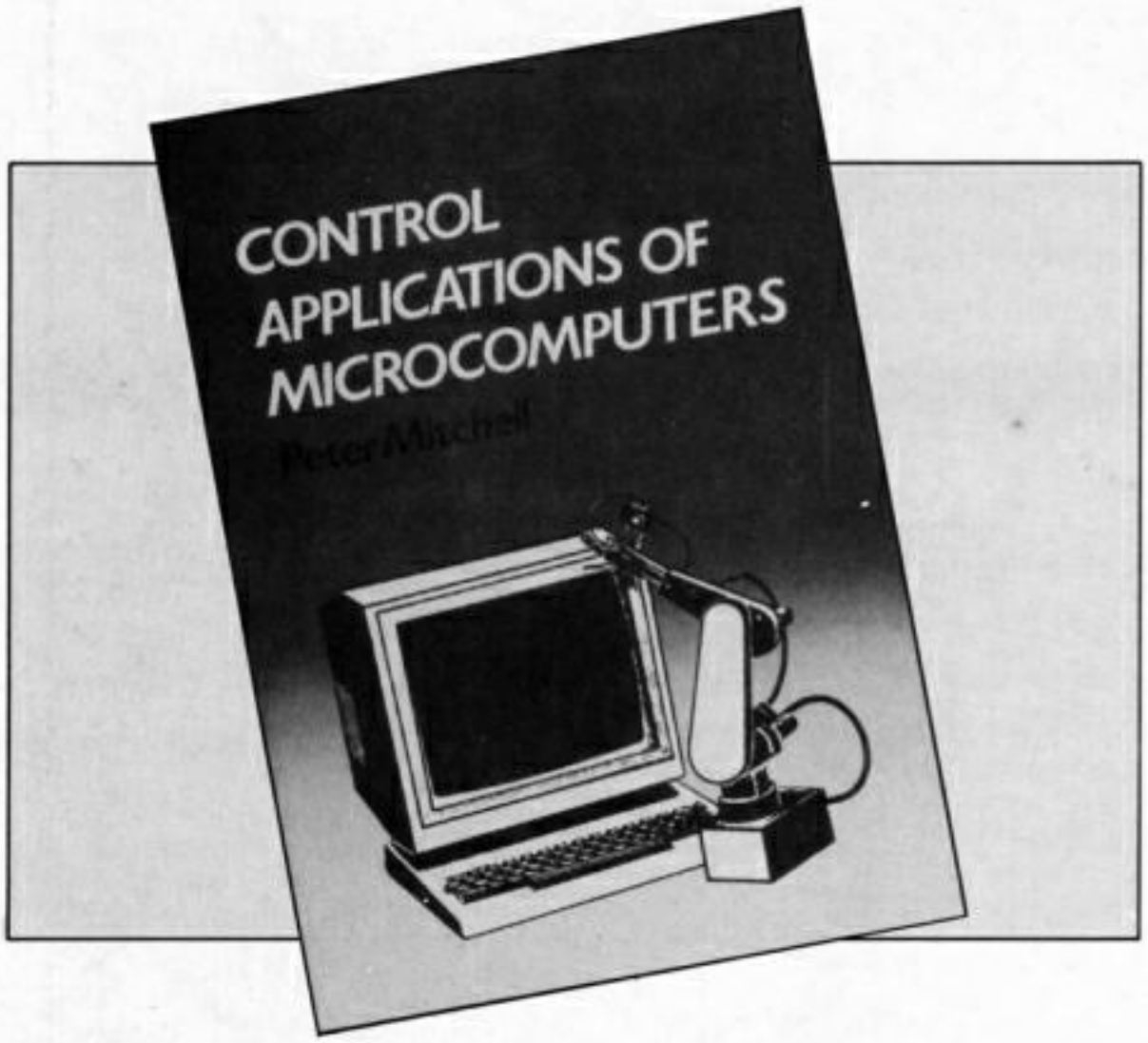
```
  830 VDU24,1040;288;1204;312;:GCOL0,1
28:CLG:VDU26:GCOL0,2:MOVE1032,312:PRIN
T"000":GCOL3,3:MOVEX%,Y%:PRINTCHR$224:
ENDPROC
  840 GCOL3,3:MOVEX%,Y%:PRINTCHR$224:G
COL0,0:FOR A%=76 TO 28 STEP -8:MOVE((E
%*200)-80)+A%,648:DRAW((E%*200)-80)+A%
,898:MOVE(((E%*200)+16)-A%)-72,648:DRA
W(((E%*200)+16)-A%)-72,898:SOUND1,-15,
A%*3,1:NEXT A%
  850 GCOL0,129:VDU24,(E%*200)-80;580;
((E%*200)+16)-80;870;:CLG:VDU26:F%=0
  860 ED=0:GCOL0,0:MOVEQ%,U%-12:PRINTC
HR$242:MOVEQ%,U%+20:PRINTCHR$242:Q%=Q%
-56:IF Q%=944 U%=U%+80:Q%=1224:IF U%=2
16 ED=1
  870 SC$=STR$(S%):L%=LEN(SC$):S$=STRI
NG$(4-L%,"0")+SC$:VDU24,572;236;856;32
4;:GCOL0,128:CLG:VDU26:GCOL0,3:MOVE584
,312:PROCbig(S$)
  880 ENDPROC
  890 DEFPROCFire
  900 GCOL3,3:MOVEX%,Y%:PRINTCHR$(224)
  910 SOUND0,1,6,2:H%=0
  920 IF X%+40>E%*200-144 AND X%+40<E%
*200 AND Y%-16>724 AND Y%-16<864 THEN
H%=1
  930 C=0:D=0:FOR A%=88 TO 1088 STEP 2
00
  940 IF X%>=A% AND X%<=A%+4 C=1
  950 IF Y%>=804 AND Y%<=812 D=1
  960 NEXT A%
  970 IF C=1 AND D=1 S=100:GOTO 1010
  980 IF POINT(X%+40,Y%-16)=3 S=20
  990 IF POINT(X%+40,Y%-16)=2 S=50
 1000 IF POINT(X%+40,Y%-16)=1 AND X%+4
0>=(E%*200-88) AND X%+40<=(E%*200-56)
AND Y%-16>=778 AND Y%-16<=810 S=80
 1010 S%=S%+S
 1020 IF H%=1 X1%=8+(3*(X%+40-(E%*200-
128))):Y1%=48+(3*(Y%-744)):GCOL0,0:MOV
EX1%,Y1%:PRINTCHR$237:GCOL3,2:MOVEX1%,
Y1%:PRINTCHR$237:FORA=0TO50:NEXTA:MOVE
X1%,Y1%:PRINTCHR$237
 1030 SC$=STR$(S):L%=LEN(SC$):S$=STRIN
G$(3-L%,"0")+SC$:VDU24,1040;288;1204;3
12;:GCOL0,128:CLG:VDU26:GCOL0,2:MOVE10
32,312:PRINTS$
 1040 GCOL3,3:MOVEX%,Y%:PRINTCHR$224
 1050 ENDPROC
 1060 DEFPROCcloseup
 1070 C%=3:R%=180:FOR Z%=1 TO 3:GCOL0,
C%
 1080 MOVE224+R%,220
 1090 FOR A%=0 TO 360 STEP 20
 1100 MOVE224,224:PLOT85,224+R%*COS(RA
D(A%)),224+R%*SIN(RAD(A%))
 1110 NEXT A%
 1120 R%=R%/2+18:C%=C%-1
 1130 IF R%=72 THEN R%=36
 1140 NEXT Z%
 1150 ENDPROC
 1160 DEFPROCbig(A$)
 1170 LOCALA%,X%,Y%,J%,K%
 1180 FORI%=1TOLEN A$:?&90=ASC(MID$(A$
,I%,1)):A%=10:X%=&90:Y%=0:CALL&FFF1:FO
RJ%=0TO1:VDU23,255:FORK%=2TO9:VDU?(&90
+4*J%+K%DIV2):NEXT:VDU255,10,8:NEXT:VD
U11,11,9:NEXT
 1190 ENDPROC
 1200 DEFPROCintro
 1210 COLOUR131:CLS:VDU23,252,255,255,
192,192,223,223,216,216,23,253,216,223
,223,195,195,251,251,27,23,254,27,27,2
51,251,3,3,255,255,19,1,6,0,0,0,19,0,4
,0,0,0,5
 1220 GCOL0,0:FOR A%=0 TO 48 STEP 4:MO
VE8+A%,4+A%:DRAW1271-A%,4+A%:DRAW1271-
A%,1019-A%:DRAW8+A%,1019-A%:DRAW8+A%,4
+A%:NEXT A%
```

PROCEDURES	
Screen	Draw main screen
Target	Open and close target
Fire	Check which part of target hit
closeup	Draw large magnified target
big	Large print routine
intro	Draw title screen
Joy	Move sight using joystick
topfive	List the top five scores
name	Enter your name in table

```
 1230 FOR A%=0 TO 40 STEP 4:IF A%<24 T
HEN GCOL0,1 ELSE GCOL0,0
 1240 MOVE360-A%,740-A%:DRAW912+A%,740
-A%:DRAW912+A%,908+A%:DRAW360-A%,908+A
%:DRAW360-A%,740-A%:NEXTA%:GCOL0,0
 1250 VDU24,360;740;912;908;:GCOL0,130
:CLG:MOVE448,884:PROCbig("PISTOL"):MOV
E384,812:PROCbig("SHOOTING")
 1260 VDU24,136;564;1136;680;:GCOL0,12
9:CLG:VDU26:GCOL0,0:MOVE136,564:DRAW11
36,564:DRAW1136,680:DRAW136,680:DRAW13
6,564
 1270 VDU26:MOVE160,656:PROCbig("By Da
vid Taylor")
 1280 GCOL0,130:VDU24,168;220;1104;548
;:CLG:MOVE168,220:DRAW1104,220:DRAW110
4,548:DRAW168,548:DRAW168,220
 1290 TT=0:IF S%>LW PROCname:VDU24,176
;228;1096;540;:CLG:TIME=1000:TT=1:GOTO
 1310
 1300 VDU26:MOVE384,528:PRINT"CONTROLS
":MOVE192,464:PRINT"Z.........LEFT":MO
VE192,416:PRINT"X........RIGHT":MOVE19
2,368:PRINT":.........UP":MOVE192,32
0:PRINT"/.........DOWN":MOVE192,272:PR
INT"Return....FIRE"
 1310 VDU24,168;64;1104;200;:GCOL0,129
:CLG:VDU26:MOVE168,64:DRAW1104,64:DRAW
1104,200:DRAW168,200:DRAW168,64:MOVE19
2,176:PRINT"PRESS SPACE OR":MOVE256,11
2:PRINT"FIRE TO PLAY"
 1320 IF TT=1 THEN 1340
 1330 TIME=0:REPEAT:B%=ADVAL(0) AND 3:
UNTIL INKEY-99 OR B%=1 OR B%=2 OR TIME
>=1000
 1340 IF TIME<1000 THEN 1360
 1350 IF TIME>=1000 SP=0:PROCtopfive:I
F SP=1 THEN 1360 ELSE IF SP<>1 THEN 12
80
 1360 J%=0:VDU19,1,1,0,0,0,19,0,0,0,0,
0,4
 1370 IF B%=1 M%=1:GOTO 1390
 1380 IF B%=2 M%=1:J%=2 ELSE M%=0:J%=0
 1390 ENDPROC
 1400 DEFPROCJoy
 1410 IF ADVAL(1+J%)>=40960 X%=X%-((AD
VAL(1+J%)-40960)/768)
 1420 IF ADVAL(1+J%)<=25600 X%=X%+((25
600-ADVAL(1+J%))/768)
 1430 IF ADVAL(2+J%)>=40960 Y%=Y%+((AD
VAL(2+J%)-40960)/768)
 1440 IF ADVAL(2+J%)<=25600 Y%=Y%-((25
600-ADVAL(2+J%))/768)
 1450 MOVEX%,Y%:PRINTCHR$(224)
 1460 IF F%=1 THEN 1520
 1470 B%=ADVAL(0) AND 3
 1480 IF J%=2 THEN 1500
 1490 IF B%=1 F%=1:PROCFire:GOTO 1510
ELSE 1510
 1500 IF B%=2 F%=1:PROCFire
 1510 IF B%=3 F%=1:PROCFire
 1520 ENDPROC
 1530 DEFPROCtopfive
 1540 GCOL0,130:VDU24,176;228;1096;540
;:CLG
 1550 N1=1
 1560 N2=1
 1570 IFNM$(N2)<NM$(N2+1)THEN1610
 1580 A$=NM$(N2)
 1590 NM$(N2)=NM$(N2+1)
 1600 NM$(N2+1)=A$
 1610 N2=N2+1
 1620 IFN2<5THEN1570
 1630 N1=N1+1
 1640 IFN1<5THEN1560
 1650 P=0:MOVE352,528:PRINT"TOP SHOTS"
:FORA%=5TO1STEP-1
 1660 N3=0:REPEAT:W1$=RIGHT$(NM$(A%),N
3):N3=N3+1:UNTILASC(W1$)<=57ANDASC(W1$
)>=48:N3=N3-2:N4=LEN(NM$(A%))-N3:N5=14
-(N3+N4+3):N$=STR$(6-A%)+") "+LEFT$(NM
$(A%),N4)+STRING$(N5,".")+RIGHT$(NM$(A
%),N3):LW=VAL(LEFT$(NM$(A%),N4)):NM$(A
%+5)=N$
 1670 MOVE192,464-P:PRINTNM$(A%+5):P=P
+48
 1680 NEXTA%
 1690 DATA100Spud,200Dave,350Nick,500D
ave,700Spud
 1700 SP=0:TIME=0:REPEAT:B%=ADVAL(0) A
ND 3:UNTIL INKEY-99 OR B%=1 OR B%=2 OR
 TIME>=1000
 1710 IF TIME>=1000 ENDPROC
 1720 IF B%=1 M%=1:GOTO 1740
 1730 IF B%=2 M%=1:J%=2 ELSE M%=0:J%=0
 1740 SP=1
 1750 ENDPROC
 1760 DEFPROCname
 1770 W2$="":*FX21
 1780 VDU26:MOVE192,528:PRINT"PLEASE E
NTER":MOVE192,464:PRINT"YOUR NAME":MOV
E192,296:PRINT"""""""":FORA%=1TO5:REPEA
T:B%=GET:UNTIL B%=127 AND LEN(W2$)>=1
OR B%=13 OR (B%>=65 AND B%<=90)
 1790 IF B%>=65 AND B%<=90 W2$=W2$+CHR
$(B%):GCOL0,0:MOVE128+(LEN(W2$)*64),33
6:PRINTCHR$B%
 1800 IF B%=127 W$=LEFT$(W2$,LEN(W2$)-
1):W10$=W2$:W2$=W$:GCOL0,2:MOVE192+(LE
N(W$)*64),336:PRINTRIGHT$(W10$,1):A%=A
%-2
 1810 IF B%=13 A%=5
 1820 NEXT A%
 1830 NM$(1)=STR$(S%)+W2$
 1840 IF S%>=HS% HS%=S%:HS$=STR$(HS%):
L%=LEN(HS$):H$=STRING$(4-L%,"0")+HS$
 1850 S%=0:GCOL0,0
 1860 ENDPROC
```

VARIABLES	
S%	Score
HS%	High score
X%	X coordinate of sight
Y%	Y coordinate of sight
NM$	Top five scores

Taking control



Joe Pritchard reviews a book for DIY enthusiasts

THOSE of you who have been following my interfacing articles – Hardware Projects – will have picked up some of the basics of using the Electron to control other electronic devices, and I hope that the articles have encouraged you to try a few simple experiments.

One problem has always been how to start, and this book, Control Applications of Microcomputers, although not aimed specifically at Electron users, will get you going in the right direction, though a little extra help may be needed.

In it, Peter Mitchell offers a 160 page introduction to this vast area. The material is clearly aimed at the beginner, and the techniques needed to interface a variety of different devices, such as LEDs and stepper motors, are described.

The material is presented in a fairly easygoing and logical manner with chapters on number systems, logical operators and logic gates and 6502 assembler among the hardware information.

The diagrams are clear and meaningful, and the software side of control is covered with some introductory information on the 6522 VIA as used in the BBC Micro, the ACP Plus 5 and other user ports for the Electron. Listings in Basic and 6502 assembly language are given throughout the book for the Pet – a very old micro, late but not much lamented – Commodore 64 and BBC Micro.

The techniques described, will suit any Electron with a user port, and it's just a case of altering addresses referred to in the programs. Anyone with even a limited knowledge of Basic will have little difficulty.

An index is provided, but there's no glossary which would have been particularly useful, as computer control technique is littered with technical terms. Exercise programs are provided with typical solutions.

Building a circuit

Control applications rely on at least a small amount of electronic construction. A little practical knowledge would be required to build the circuits described in the book. An absolute beginner might have difficulty due to lack of information on the "nuts and bolts" side of building interfaces such as soldering, where to get components and the resistor colour code.

Anyone expecting a cookbook approach, with fully detailed instructions of how to build the more esoteric devices used in interfacing such as fast analogue to digital converters, digital to analogue converters and so on, will be disappointed.

These are covered at a system level – the connections needed to a typical ADC or DAC are there, but no specific circuit details are given. Fair enough, as detailed instructions to build such devices could easily take up a couple of complete chapters – quite a lot of space in an introductory guide such as this.

The book is aimed at users of three computers, and so loses a little of the machine specific information that many of us will be used to. For example, the typical analogue to digital converter referred to plugs in to the user port of any of the computers mentioned in the book, but no mention is made of the ADC built in to the BBC Micro, information that would be quite useful to Plus 1 owners.

Criticisms

A similar criticism must be levelled at a couple of assembly language listings that write text to the screen. The method shown to write to a BBC Mode 7 screen is to access it directly with an STA instruction rather than to go through the osascii or oswrch operating system routines. This is used to demonstrate the use of STA, but these programs would need altering to run properly on the Electron due to the lack of a Mode 7 screen.

Despite these points, I did enjoy the book and feel that it presents a reasonable survey of an area of computer application that is rather neglected by the computer book publishers. The publisher, Edward Arnold, is known for its textbooks, and I get the impression that this is, at least in part, aimed at schools, where I feel that guidance from teachers would be on hand to help pupils through the practicalities of building circuits.

The chapters on machine code are particularly good as a general introduction to the basic 6502 instructions – certainly enough to allow the newcomer to sit down with a more specific Electron oriented book with more confidence.

It will help typical *Electron User* readers to get started on control, particularly if they have never had any contact with the subject. But when tackling the practical side be prepared to get a simple electronics book or a more experienced friend to help you out.

Title: Control Applications of Microcomputers
Price: £8.95
Supplier: Edward Arnold, 41 Bedford Square, London WC1B 3DQ.
Tel: 01-637 7161

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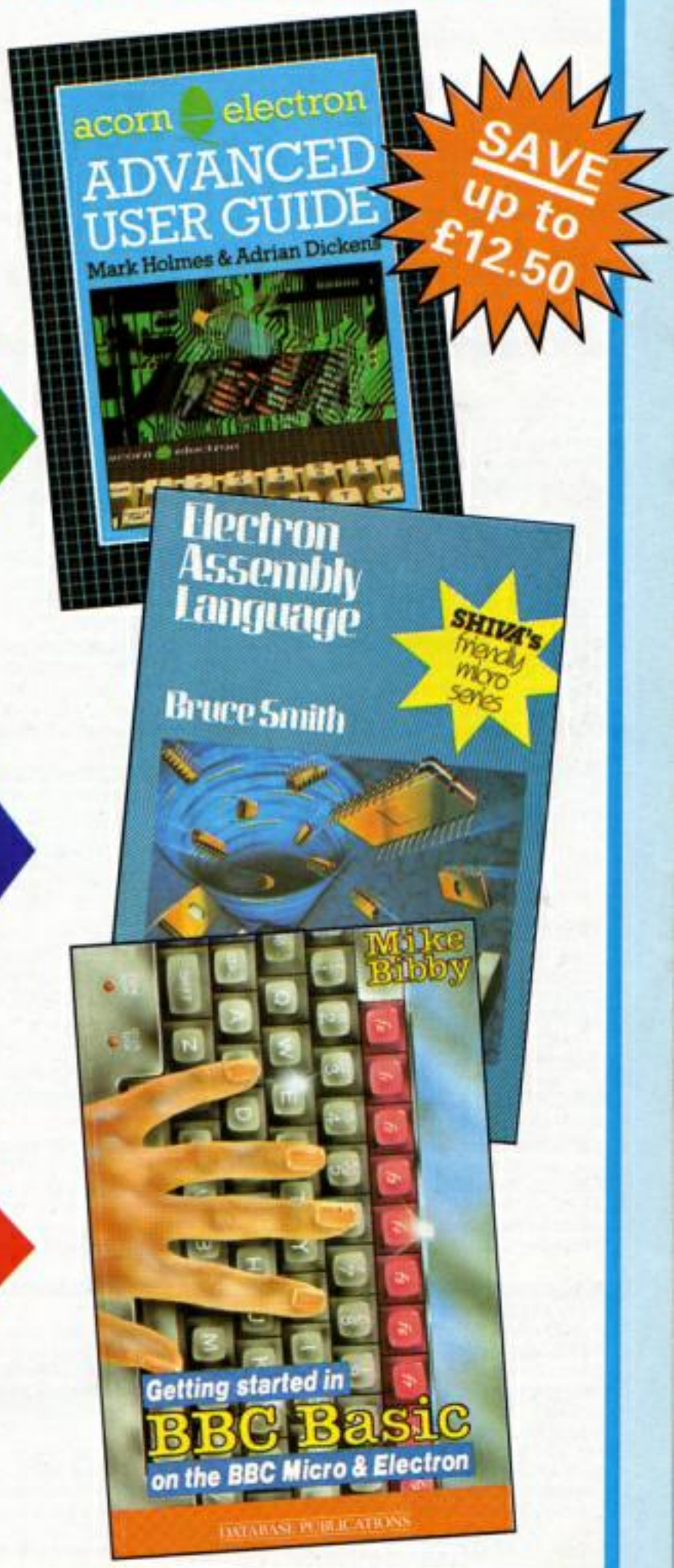

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18. *DUMP – to view a file's contents on screen.
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"STOP PRESS"

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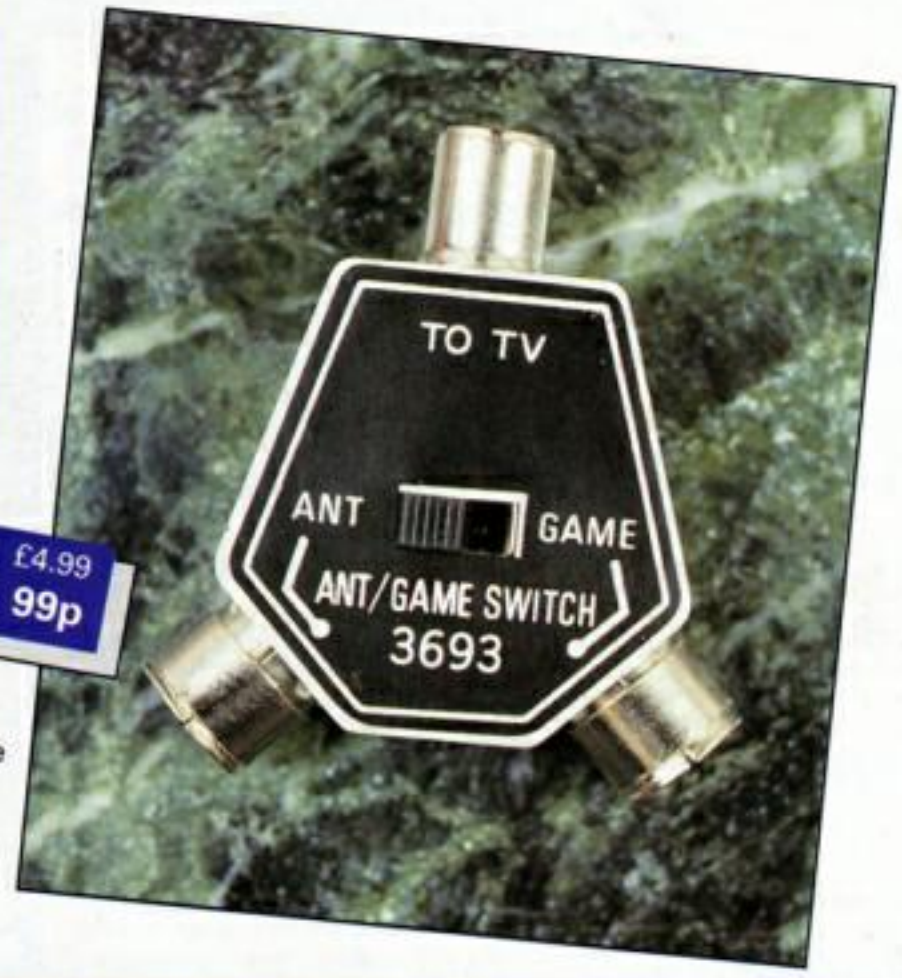

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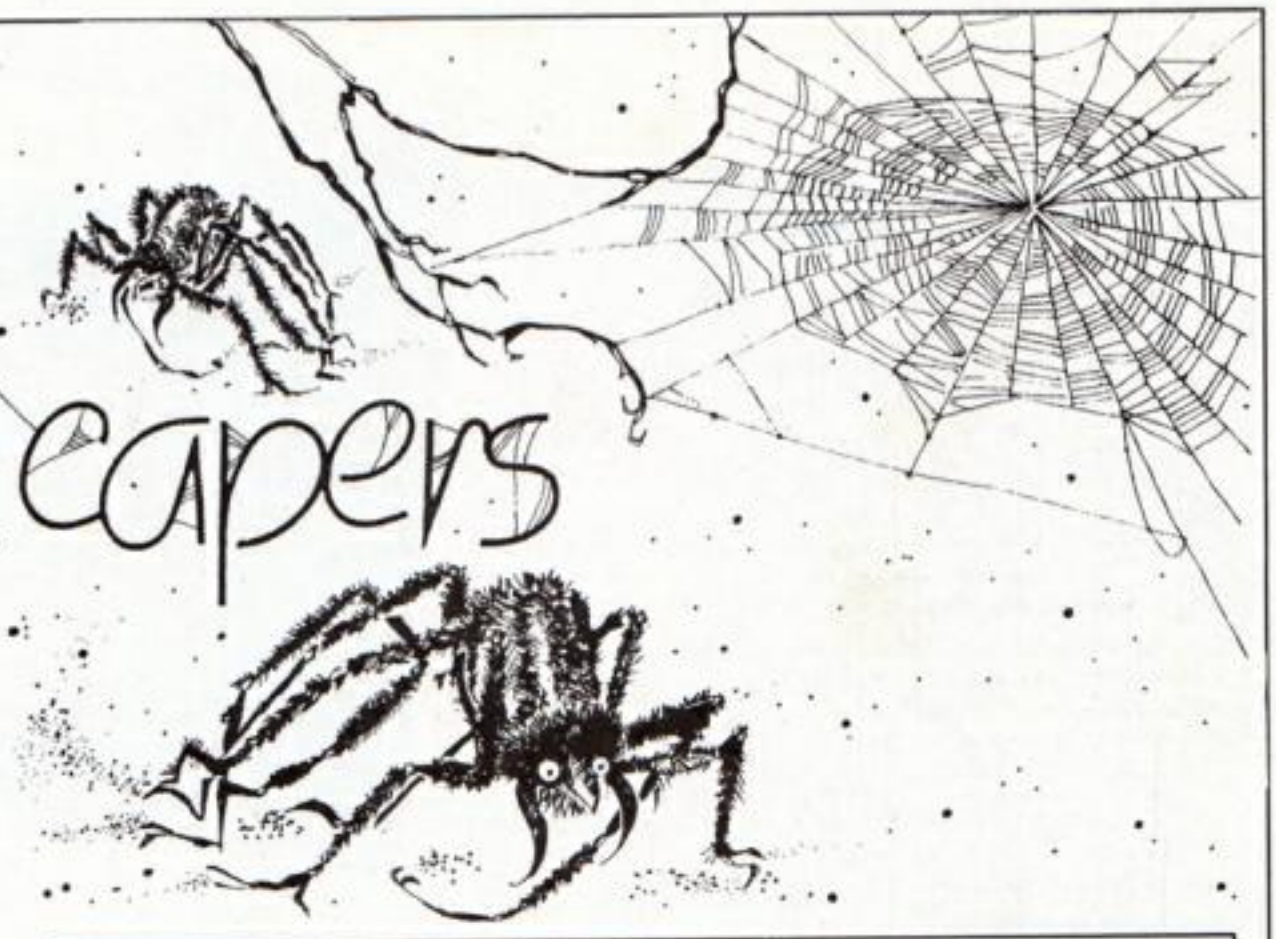


Improve your spelling with the aid of Neil Davidson's fun game for young children

IN this educational game designed to help children improve their spelling you are required, not to spell complete words, but just to fill in a few missing letters. However, it's not as easy as it might seem ...

You play the part of Spencer Spider who is competing with Archie Arachnid to get the curds and whey left behind by little Miss Muffet. At the start of the game you both hang from the brickwork at the top left-hand corner of the screen and dangle just above the ground.

First enter the speed of the game – press from 1 for slow to 9 for fast – followed by the difficulty level – 1 is easy, 9 is difficult. The speed sets the time allowed to answer each question, and the difficulty controls how far above the ground your rival Archie hangs.

A word will slide across the bottom of the screen on rollers and come to rest just right of centre. One of the letters in the word is missing and in the bottom left-hand corner are several alternatives. Press the key corresponding to the correct letter. This fires it out of a cannon and it will land in the correct position in the word, plugging the gap.

With every correct answer Spencer drops closer to the ground, but get it wrong and Archie drops down. When either of the spiders reaches the ground it will scurry across and grab the curds and whey and perform a victory dance accompanied by a cheery tune before making off with it.

If Spencer wins the curds and whey you move on to the next round and the game becomes slightly more difficult. If Archie wins you return to the beginning and start all over again.

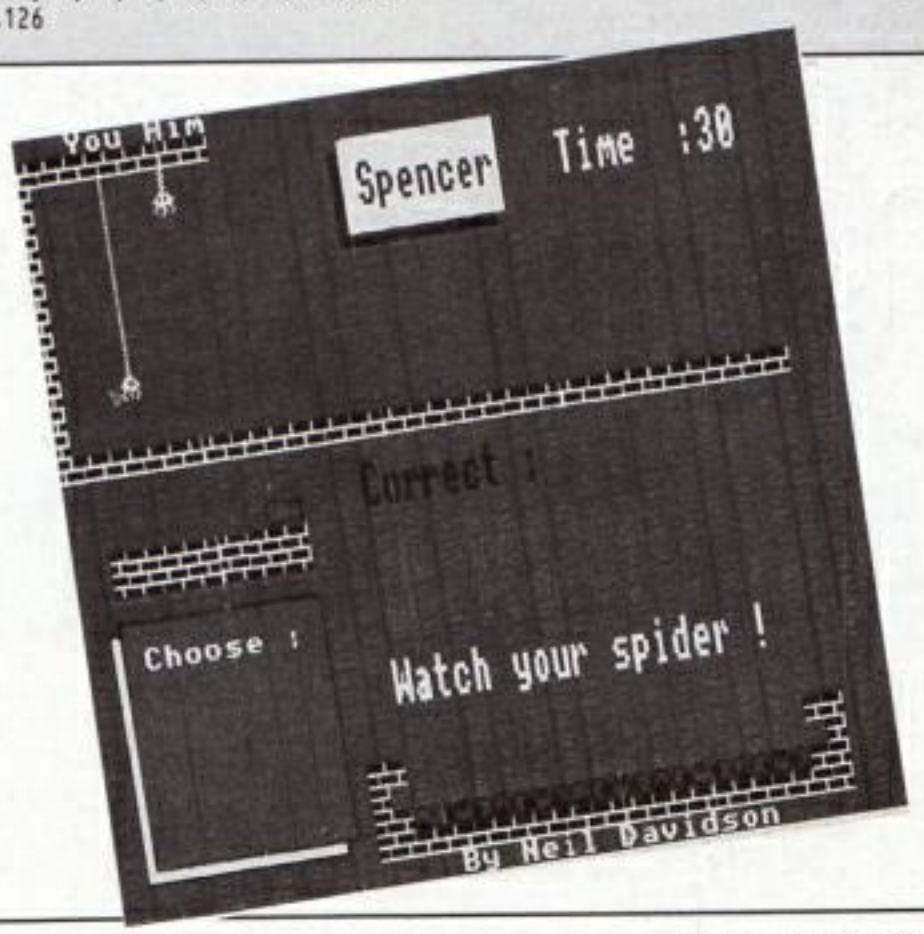
There are 36 sample words included in the listing, starting at line 620 and you can alter them, or add more of your own. Indicate the missing letter by an underscore and follow the word with four alternative letters and finally the correct one like:

```
625 DATA Ele_tronktqpc
```

The word is Electron, and the missing letter is indicated by the underscore character. The four alternative letters are ktqp and the correct one is the last letter, c. If you add more words like this you'll also have to alter the DIM *w$* in line 50, which is currently set at 40 words.

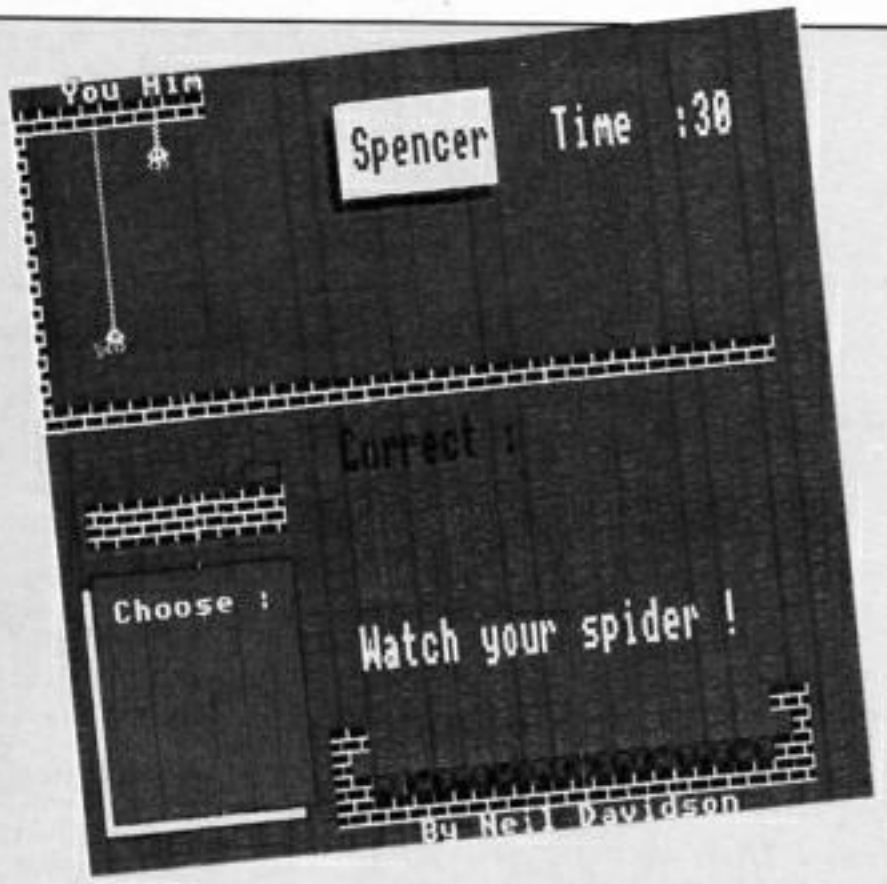
```
   10 REM Spencer Spider
   20 REM By Neil Davidson
   30 REM (c) Electron User
   40 IF PAGE>&E00 GOTO 660
   50 MODE1:DIMw$(40):L%=20:TI%=0:C$1%
=0:C$2%=1:SC%=0:WH%=0:iv=47.6731295:wd
$=STRING$(20," "):nw$=STRING$(10," "):
w$=STRING$(15," "):LT%=0:L$=STRING$(10
," "):P$=STRING$(40," "):W2$=STRING$(2
5," "):W2$="":FORI%=1 TO 25
   60 W2$=W2$+CHR$(231+I% MOD4):NEXT:W
H$=LEFT$(W2$,20):B%=FALSE:VDU23,224,&3
F,&40,&80,&80,&80,&80,&40,&3F,23,225,0
,0,&7,&1F,&7F,&7F,&3F,0,23,227,3,&FF,1
,2,2,1,&FF,3,23,228,0;&FE,&FC,&FC,&FE,
0;23,229,0;0,&40,&A0,&1010;&10
   70 VDU23;8202;0;0;0;23,234,&3C,&42,
&87,&8F,&8F,&87,&42,&3C,23,233,&3C,&42
,&81,&81,&99,&BD,&7E,&3C,23,232,&3C,&4
2,&E1,&F1,&F1,&E1,&42,&3C,23,231,&3C,&
7E,&BD,&99,&81,&81,&42,&3C,23,235,&3C,
&56,&D7,&7E,&52,&89,&52,0
   80 VDU23,236,&8,&3C,&6A,&EB,&7E,&4A
,&91,&4A,23,237,8,&10,8,&10,8,&10,8,&1
0,23,238,&FEFE;&FE,0,&F7F7;&F7,0,23,23
9,&FF,&7E,&7E,&FF,&BF,&9F,&8F,&FF:ENVE
LOPE 1,131,-1,-1,-1,45,55,65,126,0,0,-
126,126,126
   90 ENVELOPE2,5,5,0,-5,5,0,5,126,0,0
,-126,126,126:ENVELOPE3,1,1,0,-1,1,0,1
,126,0,0,-126,126,126:ENVELOPE4,1,2,0,
-1,2,0,4,126,0,0,-126,126,126:VDU19,2,
4,0;0;
  100 C1%=1:C2%=2:C3%=3:PROCw(520,960,
256,128):COLOUR0:COLOUR131:VDU31,17,3:
PROCd("Spencer"):C1%=3:C2%=1:C3%=2:PRO
Cw(64,384,320,320):COLOUR3:COLOUR130:P
RINTTAB(3,21);"Choose :":COLOUR2:COLOU
R128
  110 VDU31,27,1:PROCd("Score :0 "):CO
LOUR3:VDU31,27,3:PROCd("Time  :0 "):CO
LOUR1:PRINTTAB(15,29);WH$:MOVE320,512:
VDU5,18,0,1,224,227,8,8,18,0,2,225,228
,8,8,11,229,4:COLOUR1:COLOUR131
  120 PRINTTAB(2,17);STRING$(10,CHR$23
8);STRING$(10,CHR$8);CHR$10;STRING$(10
,CHR$238);TAB(13,30);STRING$(24,CHR$23
8);TAB(0,1);STRING$(10,CHR$238);TAB(0,
1);STRING$(12,CHR$238+CHR$10+CHR$13);T
AB(0,13);STRING$(37,CHR$238)
  130 PROCbox(64,416,64,320)
  140 PRINTTAB(13,29);CHR$238;CHR$238;
TAB(35,29);CHR$238;CHR$238;TAB(13,28);
```

Turn to Page 32 ►



◀ From Page 31

```
CHR$238;TAB(36,28);CHR$238;TAB(13,27);
CHR$238;CHR$238;TAB(35,27);CHR$238;CHR
$238
  150 COLOUR3:COLOUR128:PRINTTAB(3,0);
"You Him":PRINTTAB(17,31);"By Neil Dav
idson";
  160 RESTORE 620:I%=0:REPEAT:I%=I%+1:
READw$(I%):UNTILw$(I%)="END":MX%=I%-1:
VDU28,15,25,38,15:COLOUR1:PROCd("Speed
 level (1-9) ?"):SP%=(10-FNk)*5:CLS:PR
OCd("Level (1-9) ?"):S2%=FNk+2:CLS:S1%
=8:S3%=S1%:S4%=S2%:VDU26
  170 PROCn:REPEAT:E%=FALSE:COLOUR3:CO
LOUR128:S1%=S3%:S2%=S4%:FORI%=2 TO 12:
PRINTTAB(4,I%);" ";TAB(7,I%);" ":NEXT:
FORI%=1 TO S1%-2:PRINTTAB(4,I%+1);CHR$
237:NEXT:PRINTTAB(4,I%+1);CHR$235
  180 FORI%=1 TO S2%-2:PRINTTAB(7,I%+1
);CHR$237:NEXT
  190 PRINTTAB(7,I%+1);CHR$236:COLOUR2
:COLOUR128:PRINTTAB(30,12);CHR$239:REP
EAT:LT%=LT%-1:SOUND1,3,10,254:REPEAT:C
OLOUR2:COLOUR128:wd$=RIGHT$(wd$,21)+MI
D$(nw$,NL%,1)
  200 PRINTTAB(14,28);wd$:NL%=NL%+1:WH
$=MID$(W2$,WH%,20):COLOUR1
  210 PRINTTAB(15,29);WH$:WH%=(WH% MOD
 4)+1:IFNL%=LENnw$+1 PROCn
  220 PROCwb(0):UNTILMID$(wd$,12,1)="_
":COLOUR3:PRINTTAB(25,28);"_":ps$=MID$
(P$,37-LT%*4,4):lt$=MID$(L$,10-LT%,1):
SOUND&11,3,50,2
  230 VDU28,2,28,11,23:COLOUR130:COLOU
R0:CLS:FORI%=1 TO 4:PRINTTAB(4);MID$(p
s$,I%,1):NEXT:COLOUR3:COLOUR128:VDU26:
TI%=0:*FX21
  240 REPEAT:T%=TI%:PROCwb(0):IFT%<>TI
% COLOUR3:VDU31,34,3:PROCd(STR$(SP%-TI
%)+" "):SOUND&11,2,TI%*2,2
  250 C$=CHR$(INKEY0 OR 32):UNTIL(C$>"
" AND INSTR(ps$,C$)) OR TI%=SP%:VDU28,
2,28,11,23:COLOUR130:CLS:VDU26:IFTI%<>
SP% PROCfr(ASCC$)
  260 IFlt$<>C$ OR TI%=SP% PROCwg ELSE
 PROCct
  270 UNTILE%=TRUE:UNTILB%=TRUE:RUN:EN
D
  280 DEFPROCfr(C%):GCOL3,2:GCOL0,128:
T=0:X%=T*iv+384:Y%=-10*(T^2)/2+512:VDU
5:MOVEX%,Y%:VDUC%:SOUND1,1,200,200:T=0
.25:REPEAT:NX%=T*iv+384:NY%=-10*(T^2)/
2+512:MOVEX%,Y%:VDUC%
  290 MOVENX%,NY%:VDUC%:X%=NX%:Y%=NY%:
T=T+0.25:VDU4:PROCwb(0)
  300 VDU5:UNTILY%<=160:MOVEX%,Y%:VDUC
%:VDU4:COLOUR2:VDU31,25,28,C%:w$=wd$:w
d$=LEFT$(w$,11)+CHR$C%+RIGHT$(w$,10):S
OUND&10,-15,100,10:PROCdy(100):ENDPROC
  310 DEFPROCn:NL%=1:w$=" "+w$(RND(MX%
)):nw$=LEFT$(w$,LENw$-5):L$=RIGHT$(L$+
RIGHT$(w$,1),10):P$=RIGHT$(P$+MID$(w$,
LENw$-4,4),40):LT%=LT%+1:ENDPROC
  320 DEFPROCw(X%,Y%,W%,L%):VDU24,X%-1
6;Y%-L%-16;X%+W%-16;Y%-16;:GCOL0,C1%+1
28:CLG:VDU26:GCOL0,C2%:PROCbox(X%-16,Y
%-16-L%,L%,W%):VDU24,X%;Y%-L%;X%+W%;Y%
;:GCOL0,C3%+128:CLG:VDU26:GCOL0,C2%:PR
OCbox(X%,Y%-L%,L%,W%):ENDPROC
  330 DEFPROCbox(X%,Y%,L%,W%):MOVEX%,Y
%:DRAWX%+W%,Y%:DRAWX%+W%,Y%+L%:DRAWX%,
Y%+L%:DRAWX%,Y%:ENDPROC
  340 DEFPROCwb(S%):IFTIME<33 ENDPROC
ELSE IFS%=1 THENSOUND&11,3,S1%*10,2 EL
SE IFS%=2 THENSOUND&11,3,S2%*10,2
  350 COLOUR3:COLOUR128:PRINTTAB(4,S1%
);CHR$(235+CS1%);TAB(7,S2%);CHR$(235+C
S2%):CS1%=CS1% EOR 1:CS2%=CS2% EOR 1:T
IME=0:TI%=TI%+1:ENDPROC
```




```
  360 DEFPROCct:SC%=SC%+1:COLOUR2:COLO
UR128:VDU31,34,1:PROCd(STR$SC%):COLOUR
3:VDU28,15,25,38,15:FORI%=200 TO 50 ST
EP-50:SOUND1,2,I%,20:NEXT:CLS:COLOUR1:
PROCd("Correct :"):PRINT":COLOUR2:PRO
Cd("You spelt that"):PRINT'
  370 PROCd("word right !!"):COLOUR3:P
RINT":PROCd("Watch your spider !"):VD
U26:PROCwbl(5,1):PRINTTAB(4,S1%);CHR$2
37;:S1%=S1%+1:TIME=100:PROCwb(0):OSCLI
"FX15":PROCwbl(5,1):IFS1%=12 PROCrun(4
):PROCcg
  380 VDU28,15,25,38,15:CLS:VDU26:ENDP
ROC
  390 DEFPROCcg:SC%=SC%+5:COLOUR2:COLO
UR128:VDU31,34,1:PROCd(STR$SC%):VDU28,
15,25,38,15:COLOUR1:CLS:PROCd("Well do
ne !"):PRINT":COLOUR2:PROCd("You beat
 the other"):PRINT':PROCd("spider."):C
OLOUR3:PRINT":PROCd("Press any key")
  400 VDU26:S1%=S1%-1:OSCLI"FX21":Z%=F
ALSE:REPEAT:T%=1:REPEAT:RESTORE 590:I%
=1:REPEAT:READA%,B%:PROCsnd:I%=I%+1:UN
TILI%=58 OR Z%=TRUE:FORU%=1 TO 7:READA
%,B%:IFT%=1 AND Z%=FALSE PROCsnd
  410 NEXT:T%=T%+1:UNTILT%=3 OR Z%=TRU
E:IFZ%=FALSE PROCdy(150)
  420 UNTILZ%=TRUE:E%=TRUE:IFSP%>5 SP%
=SP%-5 ELSE IFS4%<11 S4%=S4%+1 ELSE IF
S3%>4 S3%=S3%-1
  430 ENDPROC
  440 DEFPROCwg:COLOUR128:COLOUR3:VDU2
8,15,25,38,15:SOUND1,3,20,10:PROCdy(60
):SOUND1,3,2,10:CLS:COLOUR1:PROCd("Sor
ry :"):PRINT":COLOUR2:PROCd("You spel
t that word"):PRINT':PROCd("wrong.Try
again later."):COLOUR3:PRINT"
  450 PROCd("Watch the other spider !"
):VDU26:PROCwbl(5,2):PRINTTAB(7,S2%);C
HR$237;:S2%=S2%+1:TIME=100:PROCwb(0):P
ROCwbl(5,2):IFS2%=12 PROCrun(7):PROCsy
  460 VDU28,15,25,38,15:CLS:VDU26:ENDP
ROC
  470 DEFPROCsy:VDU28,15,25,38,15:CLS:
COLOUR1:PROCd("Bad luck"):PRINT":COLO
UR2:PROCd("The other spider got the"):
PRINT:PROCd("curds and whey."):PRINT"
:COLOUR3:PROCd("Press any key"):*FX21
  480 VDU26:S2%=S2%-1:REPEAT:PROCwb(0)
:UNTILINKEY$0>"":E%=TRUE:B%=TRUE:ENDPR
OC
  490 DEFPROCd(A$):A%=&A:X%=&70:Y%=0:F
ORZ%=1 TO LENA$:?&70=ASC(MID$(A$,Z%,1)
):CALL&FFF1:VDU23,255,?&71,?&71,?&72,?
&72,?&73,?&73,?&74,?&74,255,8,10,23,25
5,?&75,?&75,?&76,?&76,?&77,?&77,?&78,?
&78,255,11:NEXT:ENDPROC
  500 DEFPROCrun(SP%):COLOUR3:COLOUR12
8:FORI%=SP% TO 28:PRINTTAB(I%,12);" ";
CHR$(235+CS1%):CS1%=CS1% EOR 1:SOUND&1
1,2,I%*5,3:PROCdy(10):NEXT:PRINTTAB(29
,12);"
  510 FORI%=1 TO 5:PRINTTAB(30,11);CHR
$(235+CS1%):CS1%=CS1% EOR 1:SOUND&11,2
,I%*5,3
  520 PROCdy(10):NEXT:PRINTTAB(30,11);
" ":FORI%=28 TO SP%-1 STEP-1:COLOUR3:P
RINTTAB(I%,12);CHR$(235+CS1%);:COLOUR2
:PRINT;CHR$239;" ":SOUND&11,2,I%*5,3:C
S1%=CS1% EOR 1:PROCdy(10):NEXT
  530 COLOUR3:PRINTTAB(SP%-1,12);" ";T
AB(SP%,11);CHR$(235+CS1%):FORI%=1 TO 1
0:PRINTTAB(SP%,11);CHR$(235+CS1%):SOUN
D&11,2,I%*5,3:CS1%=CS1% EOR1:PROCdy(10
):NEXT:ENDPROC
  540 DEFFNk:OSCLI"FX21":REPEAT:A%=GET
-48:UNTILA%>0 AND A%<10:=A%
  550 DEFPROCdy(U%):TIME=0:REPEATUNTIL
TIME>U%:ENDPROC
  560 DEFPROCwbl(R%,S%):Z%=TI%:REPEAT:
PROCwb(S%):UNTILR%=TI%-Z%:ENDPROC
  570 DEFPROCsnd:SOUND1,4,A%,B%*2:IFIN
KEY$0>"" Z%=TRUE
  580 PROCdy(B%*12):ENDPROC
  590 DATA100,4,108,3,100,1,88,4,88,4,
88,3,80,1,88,3,92,1,88,8,92,4,80,3,100
,1,88,8,72,4,60,3,80,1,52,8,80,4,80,3,
80,2,108,2,100,2,92,2,88,3,80,1,88,3,9
2,1,88,8
  600 DATA 68,4,88,4,88,4,84,2,96,2,11
6,16,116,2,108,1,116,1,108,1,104,2,108
,2,80,2,88,2
  610 DATA92,4,88,1,92,1,88,1,72,2,108
,2,100,8,100,2,72,2,52,2,92,2,88,4,80,
4,72,4,52,2,60,2,68,2,72,2,80,2,88,2,9
2,2,72,6,72,4,72,4,72,4,72,16
  620 DATAoran_egjneg,yello_ewouw,tel_
scopeiuaee,bathro_muwioo,jell_yieuy,na
v_yeuiy,i_possiblenmpim,import_ntaeiua
,bri_kckirc,poss_bleaeuii,int_restinga
eiue,s_mpathyiyeay,se_teutaa,gover_men
tmnrtn
  630 DATAcrea_iontcszt,spi_ycsyzc,hid
d_nauiee,plea_ezscas,sep_rateeiuaa,de_
ireszcrs,ac_ompanykoucc,driv_nauiee,su
_gestjgueg,station_ryaiuoa,hospit_liea
ua,sc_oolhkcoh,sp_iyeuy,holida_yeiay,a
_roplaneaiere,par_nteaiue,excu_eczuss
  640 DATAx_lophoneeiyxy,i_propermnpim
,flow_reauie,weath_rieuae,w_etheraehwh
  650 DATA END
  660 *T.
  661 *K.0 D%=PAGE-&E00:FORI%=PAGE TO
TOP STEP4:!(I%-D%)=!I%:NEXT:!(TOP-D%)=
&FF0D:PAGE=&E00MOLDMRUNM
  670 *FX138,0,128
```

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TO ORDER PLEASE USE THE FORM ON PAGE 45

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Adventures

By Pendragon

Locked out of the Valley

I HAVE received dozens of entries to the competition I announced in the June column for readers to send in their own Top 10 favourite Electron text adventures. I am afraid that I had to disqualify a few missives that did not keep to my rule of 32k tape-based adventures only.

The most convincing chart was sent in by Emma Rutherford, a regular contributor to this column. My only point of contention is that no Larsoft adventures appear in this list. Copies of my 10 best adventures are now winging their way to Emma.

I have also received a few letters from readers who have had difficulty entering the fix published in my July 1988 column for the bug in the save game facility of Twin Kingdom Valley. I omitted to mention that TKV is a locked program. You will have to hack your way past the protection before you can alter the program.

1	Saga of a Spy Trilogy	*Robico*
2	Village of Lost Souls	*Robico*
3	Wheel of Fortune	*Epic*
4	Classic Adventure	*Melbourne House*
5	The Lost Crystal	*Epic*
6	Sphinx Adventure	*Acornsoft*
7	Woodbury End	*Shards*
8	Twin Kingdom Valley	*Bug Byte*
9	The Hunt	*Robico*
10	Philosopher's Quest	*Acornsoft*

Emma Rutherford's winning Top 10 adventures

One or two readers have also contacted me regarding difficulty in running the Topologika disc adventures. These games were written for the BBC Micro, but can be run on an Electron fitted with Slogger's Master Ram board connected to an SEDFS or Pegasus disc system. Problems begin to appear with other configurations, especially if these involve the Slogger 2.0 os and the Plus 1. Poking into the Plus 1 (Micro Messages, August 1988) may help you.

I have come across a similar problem with some Level 9 adventures. However, once I had disabled the Plus 1 and relocated the loading page, these adventures ran without a hitch.

Two new adventures arrived in my throne room this month, both of which deserve a mention before I sharpen my quill for review

Problems

For the benefit of Chris Campbell, Victor Robinson and any other readers still floundering in Micropower's ***Adventure****, these two tips may prove helpful: Kill the dragon with your bare hands and store all the treasures you find in the lost property office.*

Adventureland *was the first adventure ever released for a home computer, yet still baffles novices and experts alike. One of the most perplexing problems involves the eggs. To elaborate on last month's hint, the correct sequence is: SAY AWAY, DROP BEES, GET EGGS, SOUTH, ENTER TREE, DROP EGG, DOWN, ENTER HOLE.*

The Elk Adventure Club's ***Axe of Kolt*** *is already posing some difficulties. In part 1 you should talk to the armourer, then buy the axe, which can be used to chop the logs. You must also give the hammer and the nails to the ferryman before boarding his ferry.*

Geoff Livesey asks how to get the platinum pyramid out of the plover room in ***Classic Adventure****. You can't get it through the crack Geoff, so use a magic word instead. Next month I will begin serialising a solution to Melbourne House's howler,* ***Dodgy Geezers****. Meanwhile Tom Jenkins needs to examine inspection point 746 as his likely point of entry to the bank in part 2 of this game.*

David Harris and Elizabeth White have written to ask about the significance of the fan in ***Enthar Seven****. As far as I am aware, it is only an insurance policy in case you overheat in the arid area. Ideally you should have the forked stick to divine a safe path across the desert.*

Escape from Pulsar Seven *continues to raise some interesting questions. James Farmer asks how to open the locker. You should discover a hammer in the engine room, James. This tool can be used to smash the locker. If you examine its contents you will find a suit which must be worn with the boots at the end of the game.*

In ***Galadriel in Distress****, Daniel Gilbert should rub the hinges with butter to prevent the gates from creaking as he opens them. The vent system in* ***Gremlins*** *is causing all sorts of problems for Darren Steer. You must trap the gremlins in the vent system, weld a plate over the vent door, then cause an explosion.*

Epic's ***The Lost Crystal*** *does not tend to pose too many questions, as the game comes with a most comprehensive Help book. However, one task which confuses a lot of people is how to deal with the hydra. Anyone who is familiar with Greek mythology will be aware that cutting off one of the hydra's heads only encourages the growth of two more. It is best to avoid this beast by wearing the cloak of invisibility or temporarily disabling her by using the sword or arquebus.*

The Nine Dancers *remains one of my all time favourite games, partly because all of the problems have logical solutions. One such chaining puzzle involves a toadstool, a hare and a dog. To get past the black dog you must first catch the hare and stuff it with the*

Adventurer's Glossary

Nails: For hammering or pulling.
Necklace: Usually a treasure, but may have magical properties if worn.
Nest: Search it, as it usually belongs to a magpie, and may contain valuable treasure.
Net: For catching fish or bigger prey.
Niche: Examine it carefully.
Note: Examine and read it.
Oak panels: May be hiding a secret door.
Octopus: Very dangerous, but its ink could be useful.
Ogre: Almost certainly needs killing.
Olive branch: An ingredient of magic.
Onyx: A treasure.
Opal: Yet another treasure.
Orange: Eat it for sustenance or instant transportation.
Orb: A mystical treasure.
Orc: A hideous, giant hobgoblin.

purposes. In Search of Atahaulpa is scribed by Anthony Lee using the Quill adventure writing utility. It is a two part archaeological fantasy based in Peru. At only £2.50, it is a bargain and must be worth a look.

Plane Crash by Labyrinth Software is a three part experience which examines the possibilities of escape from a crashed plane. The adventure is something akin to a jungle version of Winter Wonderland. It has been cleverly written with some interesting time factors operating (see our software reviews).

It is refreshing to see adventures emerging for the Electron from new software houses. This only underlines the fact that the Electron continues to flourish despite the knowledge that its contemporaries have gone the way of all dust.

A pigeon has also brought me news of two impending releases from Robico Software. Blazing Star will appear as a twin cassette graphical adventure before Christmas alongside a text-only escapade based on the story of Mutiny on the Bounty. More details on these releases will appear in next month's column.

As promised, and due to popular demand, you will see that I am featuring a much extended Problems Solved section, which contains hints and answers for well over 20 different adventures. I have also printed a map of the Lost World maze in Acornsoft's Kingdom of Hamil.

● *Next month I will feature a map from the ancestor of all micro adventures, Classic Adventure. That's it for this month, so until the rom room needs repainting, happy adventuring.*

Readers' Hall of Fame

Castle of Riddles – *Roger Asher* (continued from last month)

Go NE, W, RAINBOW, N, NW, NE, SE, NE, NW, NW, SW then drop the box and the CASE. Head NW, NE, NE, ICICLE, N, E and get the diamond. Go S, S, SE, SW then get the brooch and clock. Go NW, SW and get the mink. Travel NE, NE, NE, N, N, UP, E, JUMP and get the cushion.

Go N, N, NE, N, SE, N, then look around, OFF and drop the mink, ON, UP, OFF, N, S, ON. Drop the cushion, onyx, brooch and diamond, then go down and get the port, coin, vase and mink. UP then drop the port, coin, vase and mink. DOWN, LOOK, get the figure, necklace and tiara.

Go up and get the cushion and mink. GLOOP. Go W then drop the figure, necklace, tiara, cushion and mink. Travel E, get the diamond, port, brooch, coin and vase. Go W and drop the diamond, port, brooch, coin, vase and clock. Go E and get the onyx. Go W and drop it, then go E and down. YES, TCNPIE. Success!

Solved

pixie stool. Leave this delicacy for a while, then throw it outside the hut. The dog will eat the poisoned morsel and fall asleep, allowing you to climb the hill and enter the fairies' chambers.

An old friend, Cathy Fromant, is having headaches with ***Myorem****. I think you need to throw the fire extinguisher in the tunnel if you are to make progress to the end game.*

Geoffrey Bowen is struggling at an advanced stage of Level 9's ***The Price of Magik****. To retrieve the salt from the coloured chests you must use magik, Geoffrey. Cast the spell DOW at each chest in turn to discover the correct one to open. You must then throw the salt at the slug – seems like a good idea.*

Karen Stone and Maria Melnyk of Bradford both have dilemmas about what to do with the bull in ***Terrormolinos****. Wave your hanky and lead this creature to the china shop. Don't forget to take a photo. James Abott can't find the pink carnation in Robico's* ***Project Thesius****. I suggest you look in the flower border, beyond the lawn and paved path.*

Mr R. Withrington writes to say that each time he attempts to cross a bridge in ***Sphinx Adventure*** *the bridge collapses beneath him. If you look over your shoulder you will find that either the giant rabbit or the bear is following you, Mr Withrington. They are both too heavy for such flimsy structures as bridges. You must feed the carrot to the rabbit and use the bear for goblin baiting to avoid such catastrophes.*

In ***Potter's Staff of Law****, Sheila and Len must turn the capstan to drain the river. You may then read the runes which hold the secret incantation.* ***Suds*** *poses some real bafflers for those whose sense of humour isn't quite as warped as an elderly king like myself. For instance, to make the pass valid you will have to erase the inscription by using a leaf from the rubber plant. Later you will need the cobweb and the pancake for stage make-up.*

Jatravartid Blob can't get the machine to work in the Digital Fantasia game, ***Time Machine****. The correct procedure when you first discover the machine is GET TORCH, PLAY CASSETTE, GO MACHINE, 1, DROP TORCH, LEAVE MACHINE. Simple really.*

Meanwhile, in ***Twin Kingdom Valley****, Peter Youde must wear the uniform to get back into the castle.* ***Voodoo Castle*** *has stymied David Lowid. He must always carry the shield when venturing near exploding chem tubes. The laboratory will also provide an incredible shrinking liquid to enable him to emulate Alice and pass through the small doorway.*

A number of readers have written to ask for the names of the aliens in the Shards cracker, ***Woodbury End****. The guilty personae are Mayor Hardy, PC Armstrong, Mrs Ackroyd, Fred Bates and George Roberts.*

Finally, Duncan Beely asks me to recommend some good adventures for beginners to this form of mental exercise. You won't go far wrong with either ***Voodoo Castle, Wychwood*** *or* ***Riverdale's Suds****.*

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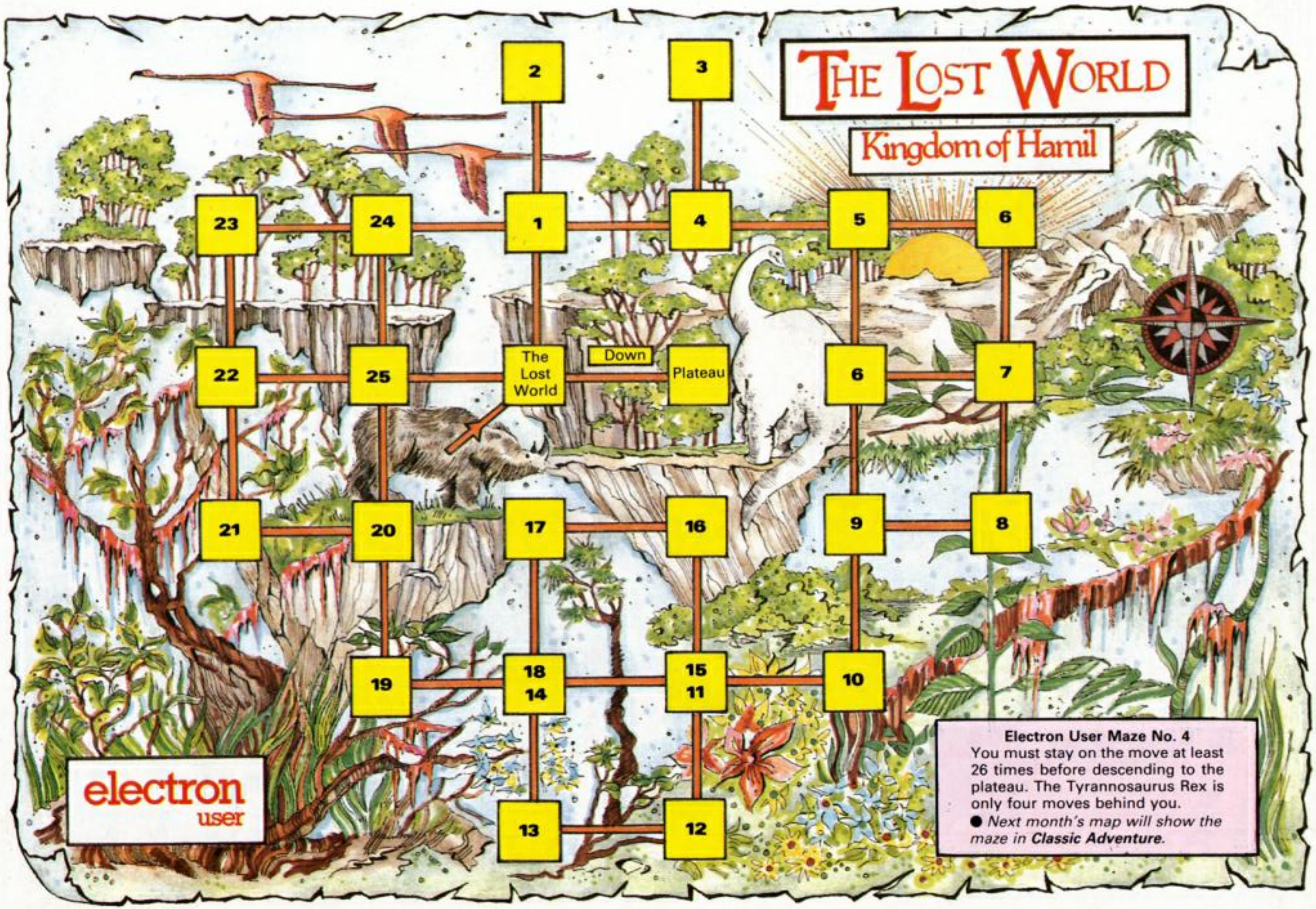
THE LOST WORLD
Kingdom of Hamil
2
3
23
24
1
4
5
6
22
25
The Lost World
Down
Plateau
6
7
21
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12
electron user
Electron User Maze No. 4
You must stay on the move at least 26 times before descending to the plateau. The Tyrannosaurus Rex is only four moves behind you.
● Next month's map will show the maze in Classic Adventure.

A new term, a new year

FREE weekend in Paris if you complete the game and break the code!

If you're studying French for GCSE or A-level this year then French on the Run is just what you need. It is specially designed to teach you the basic points of French grammar and to help you practise interactive discussion. It begins at GCSE standard, and by the time you get to the end you will be using A-level French!

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Whatever you decide to do, time is short. And there are always people willing to denounce you . . .

French on the Run is that rare combination: A truly educational program that's also a thoroughly enjoyable game. This text adventure not only tests your grammar and vocabulary, but your knowledge of France and the French way of life.

And as your French improves the language problems get harder and the situations become progressively more dangerous. There are four routes to complete in sequence – you need the password from the last before attempting the next. The standard of French required is about GCSE, though on the last route it rises to A level standard.

At the specially reduced price of £4.95 on tape, or £5.95 on disc, French on the Run is the ideal inexpensive way for you to brush up your French!

For teachers: *French on the Run uses multi-choice questions with randomised distractors, all carefully chosen to illustrate linguistic points or points concerning things French. The program is meant for individual assessment, but can be used just as effectively for classroom work. A sealed envelope contains details of how the secret passwords are created.*

Place your order TODAY, using the form on Page 45

MICRO MESSAGES

So let's stop playing games

FLICKING through the August 1988 issue of Electron User *I stopped at page four and glanced at the Gallup chart. I was more than a little displeased by what I saw. No less than 12 games in the top 20 were either re-releases or compilation packages.*

This leaves eight games, of which three are sports simulations, one an arcade conversion, one part of the never-ending saga of an electronic reptile, and another relying on media hype for sales. The other two are simply variations on a theme.

There is not a single game in the top 20 best sellers at the moment which can claim to be original, or even new. Every one seems to be a re-working of an old, often tired theme.

Who is to blame for this complete lack of originality in game design? Certainly not the software houses, who simply produce what the market demands. No software house in its right mind would release an innovative, original game at the moment, when everyone seems to be clamouring for budget re-releases of ancient titles.

So it is the software buying public who are to blame for the current river of dross flowing from the tape duplicators.

When we stop buying extra copies of games that we already have, and playing the same games that we did a couple of years ago, the software houses may start to think about writing some new games. – **Martyn Amos, Newcastle-Upon-Tyne, Northumberland.**

Disc drive or software?

I AM a teacher in a small independent school and am very interested in all the benefits that can be gained from the use of computers by the children. We have a BBC Micro, Compact and Electron in school and are making good use of the first two with their disc drives.

The Electron – won as a prize by a pupil – is not being used as much as it could be mainly because of the time factor as it does not have a disc system yet.

The problem is do we spend over £100 buying a disc drive, or do we use the money to buy essential software for the other machines? Is there enough educational software to make the upgrading of the Electron worthwhile?

I own an Electron so I am also interested in your reply. Perhaps you could recommend a place of purchase if you advise us to go ahead with the disc drive. – **Margaret Leng, Marple Bridge, Cheshire.**

● There is a fair amount of educational software around for the Electron, but unfortunately it is almost all on tape, so adding a disc drive wouldn't open up a whole new world of software to use on your micro.

The advantage would be that programs could be exchanged between the BBC Micro or Compact and the Electron by simply swapping floppy discs.

You would probably be best spending the money on software, some of it for the Electron. It should be possible to set up the micro and load the tape-based software before the lesson starts, as it only takes a couple of minutes, then you've got an extra micro to use with the pupils.

Mini Office WP on disc?

I ONCE saw a letter asking if Mini Office was available on disc. As far as I know it is not, but it is possible to put the word processor on 3.5in ADFS disc.

Copy WORD and WORD1 on to a disc using Roland Waddilove's program from Electron User *January 1986. When you want to use the word processor type:*

```
LOAD "WORD"
156 *ADFS
157 *WORD1
RUN
```

Can you help me with a small problem? With the AP3 you receive a Welcome disc. If you insert it and press Control+A+Break then catalogue the disc you will see that the library is set to the Library directory. Please could you tell me how to set my own discs to the desired library using this method? When I use it the library is set to the root directory – $.

Finally, could you recommend an astronomy program? – **J. Banks, Earby, Via Colne, Yorkshire.**

● You can't transfer the Mini Office word processor on to disc using this method as the second file WORD1 is locked and the filename contains hidden control codes.

It can be put on disc, but it's not quite as simple as you suggest. The amount of memory free is strictly limited and there's only room for just over 300 words. An E00 ADFS or DFS is required for it to be of any use.

The ADFS always sets the library to Library if such a directory exists on the disc in the root directory. If not, it is set to the root directory itself. This function can't be altered in any way.

We don't know of any astronomy programs for the Electron. Perhaps a reader can help.

Lost in the jargon jungle

I have been the owner of an Acorn Electron for just over four years. Soon after buying this micro I could get a copy of your magazine from a newsagent in my town, but after about four months I was unable to get a copy.

Until now that is. This month a copy of Electron User *did come my way and I started to read it to try to catch up on lost years, but as I turned the pages I was confronted by a whole new list of technical computer jargon which I had previously never met.*

Can you explain some of the jargon printed in the pages of Electron User*? My problems include the mass of abbreviations used in adverts and articles. Could you tell me what all this means: ADFS disc system, DFS disc system, disc drive including PSU?*

Also as I was browsing through the magazine I read not only about the Plus 1 and Plus 3 – of which I am familiar – but also of the Advanced Plus 4, Plus 5 and Plus 6. I am mystified. Please could you tell me what all these add-ons are?

I have decided to buy an Advanced Plus 1 from Pres, and am thinking of buying a Brother HR5 printer. Will the HR5 plug directly into the back of the Plus 1? Does the Advanced Plus 1 give any more memory space than my original Electron? If so, how much, and if not, how can I enlarge my computer's memory?

Finally, in a Slogger advert, and in a letter in micro messages it mentions os 1.0, os 2.0 and os 3.0. Please tell me what this means. – **Thomas How, Berkhamstead, Herts.**

● How can we hope to cover four years in the small space here in Micro Messages? Briefly, here are the answers to your queries:

When Acorn first produced the BBC Micro it originally had a disc system called the disc filing system, or DFS for short. However, this was quite dated, and better systems with improved performance were available shortly after.

When the Electron came along Acorn was in

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◀ From Page 41

the process of converting to a newer system called the advanced disc filing system, or ADFS. This enables you to store much more information on each floppy disc, and use a hierarchical or tree filing structure. Even the very latest Risc chip-based Archimedes uses the same ADFS system as in the trusty old Electron.

The BBC Micro had a power socket into which a disc drive could be plugged. The Electron hasn't got one, so a disc drive must contain its own power supply unit – PSU – as it can't draw any power from the Electron.

The Plus 5 is a triple interface unit that plugs into one of the Plus 1's cartridge sockets. It contains a tube interface, 1MHz bus and a user port. The Plus 6 is an expansion board which fits inside the Plus 1 and enables you to plug in extra roms and sideways ram.

The Brother HR5 works fine with the Electron, and plugs straight into the back of the Plus 1. However, it is a little dated now, and performance-wise isn't too hot. Though this does mean that it can be picked up really cheap if you are prepared to shop around.

The Plus 1 doesn't add any memory to the Electron. The only way to do this is to upgrade with a Slogger Master Ram Board or E2P second processor.

The os 1.0, 2.0 and 3.0 refer to different versions of an operating system – Slogger's Turbo/Master Ram Board in this case.

Finally, if anyone has trouble getting hold of *Electron User*, let us know immediately – don't wait four years to do it!

LC10 with the Electron

I HAVE been an avid reader of your magazine since I was advised to buy an Electron late last year, and I have not looked back since. I recently bought a Star LC10 printer to use with my Electron, so I flicked through a friend's back issues of Electron User *and pulled out Driver II from the August 1987 issue.*

No matter how my friend or I tried we could not get it to work with the LC10. All we get is a lot of beeps from the printer and no underlining, or anything else for that matter. Have any other readers experienced any problems with the LC10, or is it just my lack of programming skills which is at fault? – **S.E. Stevenson, RAF Bruggen.**

● We haven't used the LC10 with the Electron, so can't really help; we would suspect the listing first before looking at the printer. Check your typing carefully for errors. Can any readers suggest a remedy if it's not the listing, but a hardware fault?

Rabbit stew

I TYPED in the Randall Rabbit listing in the July 1988 issue of Electron User, *but when I ran it, it halted at line 140 after printing RANDALL RABBIT by A Houghton. I then put a STOP at line 135 between PROCgraphics and PROCassem, which again the program reached OK. So I assumed the error was in the assembly procedure, but was unable to find it. In desperation I ordered the July* Electron User *tape, and lo and behold, exactly the same problem.*

Next I thought that maybe it's because I have Slogger's Master Ram Board and Pegasus 400 disc system, although unlikely, so I tried it on a friend's unmodified Electron with the same result.

Although I thoroughly enjoy Electron User, *and have very little to complain about, I have noticed in the last few months with your justifiable boasts of new technology in printing and so on, the errors are creeping in.*

Almost every month a correction of one kind or another is published. May I say that like the weathermen, the better the computer programs the less accurate the forecast. Are you able to tell me how to get Randall to run? – **D.G.W. Rance, Eltham, London.**

● The magazine listing is OK, but unfortunately, a bug crept into early copies of the tape which has now been corrected. If you have a disc system which sets PAGE to &1900 or higher then it will run perfectly. In fact entering:

```
PAGE=&1900
```

will enable the tape version to work correctly. A better solution is to load RANDALL and alter line 60, the cause of the problem:

```
60 IF PAGE<&1901 THEN 110
```

This skips the downloader which is unnecessary for tape-based or E00 ADFS and DFS Electrons like yours.

All programs printed in this issue are exact reproductions of listings taken from running programs which have been thoroughly tested.

However on the very rare occasions that mistakes may occur corrections will be published as a matter of urgency. Should you encounter error messages when you type in a program they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

Yukky Egg

I HAVE been one of the many people who have subscribed to your excellent magazine for some time now. I have an Electron Plus 1 and greatly enjoyed the earlier of your Hardware Projects series, though I have little need for a weather station, and not enough time or cash for a buggy. I still enjoy interfacing and think you should have a regular article devoted entirely to the analogue port.

Having a smallish system, I greatly envy those with larger ones, as sometimes I am unable to use some of your utilities. Is there some way of using Snap Shot without a disc drive?

I would like to bring your attention to what I consider to be a bit of a con – 21st Software advertises Chukie Egg as suitable for the Electron. OK, so it loads and the game works, but without a Turbo Driver or Master Ram Board it'll take a real expert at the game at least a century to get past the first screen. That is, it runs too slow. – **Henry Coles, Keighley, West Yorkshire.**

● Snap Shot was designed to be used with a disc system, but you could try it with tape by first disabling cassette messages with *OPT1,0.

It sounds like you have the BBC Micro version of Chukie Egg, as the game we have is very fast and addictive – our resident arcade games freaks can get past level 20! The Electron version runs in Mode 5, but the BBC Micro version runs in Mode 2, so count the number of colours on screen, and if there's more than four you've got the wrong game.

Routine collision

HELP! I am trying to write a simple game at the moment, but I can't come up with a satisfactory collision detection routine. Can you?

When I was programming it I needed to be able to centre text across the screen on any given horizontal line, so I came up with this short but effective utility:

```
  10 INPUT "Which MODE";M%
  20 MODE M%
  30 PROCcentre("This is centred",5)
  40 END
  50
  60 DEF PROCcentre(a$,tab)
  70 PRINT TAB((?&30A+1-LEN a$)DIV 2,
tab)a$
  80 ENDPROC
```

Something I could not work out though, was how to print 80 characters per line in Mode 6. A utility published in Electron User *in the April 1988 issue only worked in Modes 1, 2 and 5. Is it possible in Mode 6?* – **David Lloyd, Broadstone, Dorset.**

● There are many different ways of detecting collisions. One possible method for Pac Man type games is to compare the X,Y coordinates of the man and monsters. If one of the monsters has the same coordinates as the man then it has gobbled him up.

Another method is to use the POINT function to return the colour of the pixel just in front of the man. If it is greater than zero then he has hit an object – perhaps a wall.

It is possible to print 80 column text in Mode 6, but it is quite a tricky piece of programming and we haven't the space to go into it here. Briefly, one way would be to first design a character set four pixels wide and eight high, then poke the character data straight into the screen memory map.

Database will not extend

AT the moment I am in the process of writing a database program on my Electron to use in conjunction with my Pegasus 400 disc drive system using PRINT# and other such commands.

However, I am having a few problems, the first being with a Can't extend *error message. If I save one database file to disc and then save another I can't go back to the first one and add more information. Is there any way round this?*

My second problem is with the No room *error. I have tried raising HIMEM to its maximum value, but I'm afraid that it won't take me long to fill this extra memory. I also tried lowering LOMEM, but this corrupted my program and lots of weird and wonderful things happened. What else can I do?*

Another problem I have encountered is the Bad mode at line xx *error message. I have checked my program and HIMEM isn't less than LOMEM, and I certainly haven't changed mode inside a procedure or function. Does this mean I have used up all the available memory? My program is 9043 bytes long and executes in Mode 1.*

My last problem concerns printing out my records. Unfortunately I don't own a printer yet and haven't access to one. Could you tell me if the following lines will print the variables a, b *and* c *on paper?*

```
10 *FX3,10
20 PRINT a,b,c
```

– J. Hare, Thornaby, Cleveland.

● The *Can't extend* error message is a problem with the disc filing system – DFS – but not the advanced disc filing system – ADFS. It occurs when one file is saved on the disc immediately followed by another. The first one can't be made any bigger because it wouldn't then fit into the space currently occupied.

It may be helpful to imagine recording a 30 minute program on your video followed by another 30 minute one. Now try extending the first one and squeezing a 45 minute program in – it simply can't be done as there's only 30 minute's worth of tape.

The solution is to leave a big enough space so that you can fit in as big a file as you are ever going to need. On a blank disc enter:

```
10 INPUT"How many bytes";B%
20 F%=OPENOUT "DATA"
30 PTR#F%=B%
40 CLOSE#F%
```

to allocate *B%* bytes of space to a file called DATA. If you save another program on this disc you'll only get the *Can't extend* error message if you try to write more than *B%* bytes to the file. (This isn't quite true as 16k blocks of disc space are allocated to files that are opened).

Your other problems can be cured by running the program in Mode 4 or 6 instead of Mode 1. Mode 6 will give you an extra 12k of memory. Even though HIMEM may be well above LOMEM you can still run out of room as Basic's stack grows down from HIMEM and its heap grows up from LOMEM. When these two structures approach each other too closely you run out of memory.

Don't lower LOMEM as you'll corrupt your program as you found out. Your two line program will correctly display the three variables on the printer.

Tails from the crypt

I TYPED in Crypton from the September 1988 issue of Electron User *and found it to be an excellent game. After struggling for several hours I finally managed to complete the first two screens, but on the third I got an error message –* Out of data.

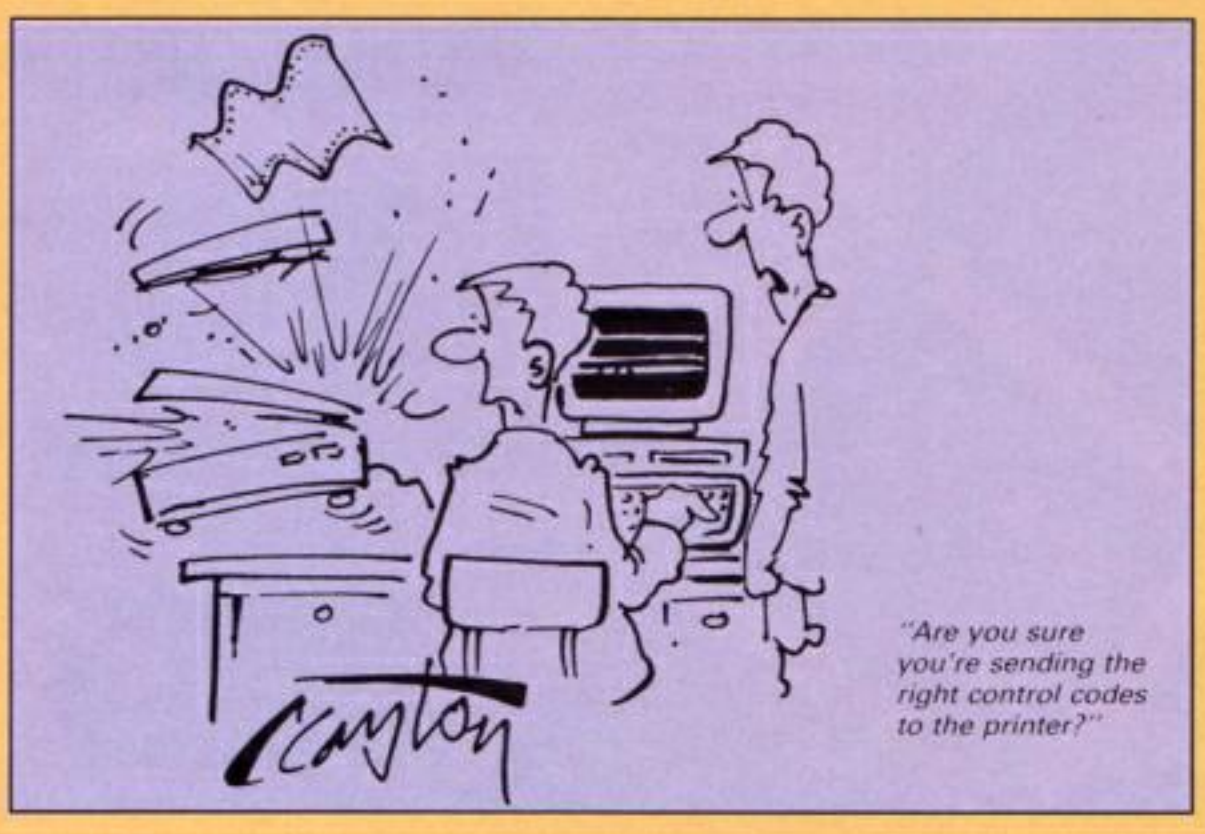
Looking at the data statements in the listing the last line seems to have too few items. Has the tail end of this been chopped off? – **Adam Brown, Altrincham, Cheshire.**

● Yes, you are right – there should be another four characters which somehow disappeared off the page. The game will run correctly until you come to the third screen. Here is the complete last line:

```
1380 DATA113111311131110100142400400
0024,114111411141114100103402400002
4,49,49,48
```

Vote of confidence

I AM the proud owner of an Electron, to which I have added a Plus 1, over 50 software cassettes, and plan to add a Plus 3, Slogger's Bicasso package, word processor and printer. Don't worry about the format of Electron User *– it is fine as it is.* – **Nick Rapson, Eggbuckland, Plymouth.**



"Are you sure you're sending the right control codes to the printer?"

Sketchy designs

WHERE would I be able to buy a replacement X key for my Electron? At the moment I am using the Escape key in the X position, but the micro looks weird without it in its normal position.

On the introductory cassette is an excellent program called Sketch which my two sons use to create designs, doodles and so on. Would it be possible for you to print in Micro Messages a listing which could be included somewhere in the program to enable them to save their pictures on a separate tape? – **R.B. Lee, Harrogate, North Yorkshire.**

● We don't know of anyone who supplies keys for the Electron. Can any readers help? Here are the modifications to the Sketch program: First load the program – don't chain it – and enter:

```
DELETE 10,70
DELETE 400,460
10 *OPT1,0
241 IF AKEY%=ASC"L" THEN *LOAD SCREEN
242 IF AKEY%=ASC"S" THEN *SAVE SCREEN
 3000 8000
```

To save a picture press S, and to load one press L. You won't see any cassette messages so make sure there is a blank cassette in your recorder and Play and Record are pressed when saving, and just Play when loading.

Little is not enough

PLEASE can you tell me how to write the following Basic program Screen Print in assembly language:

```
10 MODE 5
20 FOR screen=&5800 TO &7FFF
30 ?screen=148
40 NEXT screen
50 END
```

I know a little machine code – but not enough. – **Peter Raymond, Harlow, Essex.**

● Here's the answer to your problem:

```
  10 FOR pass=0 TO 2 STEP 2
  20 P%=&900
  30 [ OPT pass
  40 LDA #&00
  50 STA &70
  60 LDA #&58
  70 STA &71
  90 .loop
  91 LDA #148
 100 STA (&70),Y
 110 INY
 120 BNE loop
 130 INC &71
 140 LDA &71
 150 BPL loop
 160 RTS
 170 ]
 180 NEXT
 190 CALL &900
```

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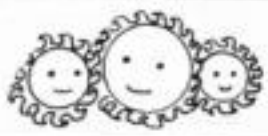

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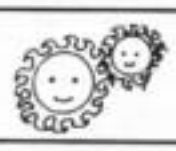

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Good quality port

IN the August 1988 issue of *Electron User* we looked at some of the useful lines brought out in the Plus 1's rom cartridge port. In our first project using this multi-function port we'll initially look at a useful control line, then get down to building an I/O port.

We've seen how the Electron can access add-ons at particular locations in its memory map by using the address lines, and transfer data between the CPU (central processor unit) and the add-on using the data lines. These data lines are rather special as they can carry information in two directions – either towards or away from the CPU.

So data is read from a rom cartridge plugged into the port, but if we had a peripheral such as a user port plugged in it would be possible for data to be transferred in both directions between add-on and CPU.

Whenever the CPU issues a READ instruction, the data lines are prepared for input and a pin called R/W is set high. This signals to a memory address, be it used for ram, rom or the control of an add-on device, that a READ is taking place. It is then up to the device accessed to put a byte on the data lines for the CPU to read. If a write operation is to be performed, the R/W pin is taken low.

The R/W signal is made available in the cartridge port at pin A4, and is an output from the CPU – which is at 5V when reading and 0V when writing information. The R/W line is what is called a control line, as it is used by the CPU to control the rest of the system.

The final connection in the cartridge port that we will require for our first project is called ROMOE. If we were to simply use the nPGFD and R/W lines to control our I/O port, we would get some rather odd results. This is because of the way in which the Electron hardware is arranged.

Joe Pritchard continues his investigation of the Plus 1's two built-in rom cartridge ports

Due to the timings of the different control signals, it's possible for a peripheral to be addressed by the Electron when it's not intended. The ROMOE can be used to reduce this tendency.

A simple I/O port

This project is an input/output port which will allow the Electron to read up to eight bits of digital information from the outside world, which could come from electronic circuits, switches, LDRs and so on, and control other electronic devices using eight output lines.

This month I'll describe the output side of things, and show how you can build a working input port. Next month we'll add the extra components needed for the output port. Building the circuit in two parts like this allows us to check the two parts separately and get each one working in turn – a much better proposition than trying to cure faults in a large circuit.

Figure I shows the input port's circuit diagram. It is the most complex add-on we've built yet, and uses three logic chips. IC1 is used for address decoding. When we add devices to a computer, we must ensure that the add-on knows when the computer is requesting a byte from it or when it's going to be sent a byte by the computer. This is done by putting the address of the external circuit on to the address lines.

Then the circuit must recognise that it is being addressed by the computer, a situation arrived at by combining the address line signals so an output signal is only generated when the address of the device is on the address lines.

In a perfect world we would combine all 16 address lines and an output signal would only be given for one specific address present on the address bus, the actual address depending upon how the address lines were combined together. This is called full decoding. Alternatively, only a few address lines might be combined together giving an output signal for a range of addresses on the address bus resulting in partial decoding.

In this design I'm using partial decoding and the nPGFD line is used to select the address, which will be any location in page &FD of the Electron's memory map. Any other hardware using this page, must then be disconnected before connecting up this circuit.

The nPGFD gives a zero output whenever page &FD is accessed by the Electron, whether for read or write operations. For the output port, we're only interested in writing data to it, so it's clear that we need to use the R/W line in some way to detect when a write operation is taking place. This line goes to logic zero whenever a write takes place.

IC1 and IC2 are used to generate an output signal to IC3 whenever the correct combinations of control signals are obtained from the cartridge port. We can then use this output, often called a select signal, to control IC3, the output latch, via pin 11. The 74LS373 chip is responsible for putting signals from the data bus of the Electron on to the output lines D0 to D7.

While the select signal is at logic one the output lines reflect the value of the input data lines. However, as soon as the select signal is zero the output is frozen at the last value that was on the

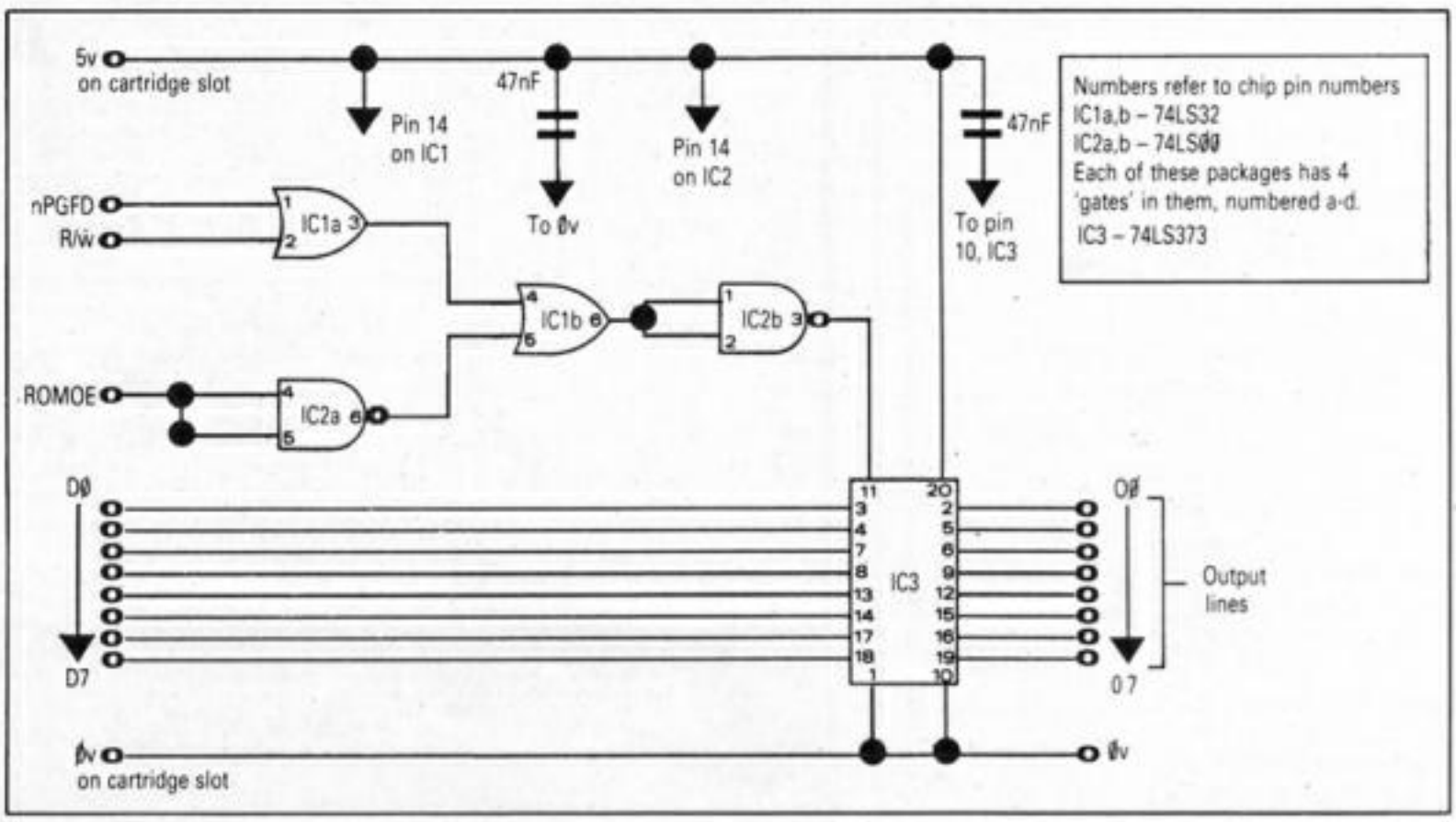

Figure I: The input port circuit diagram

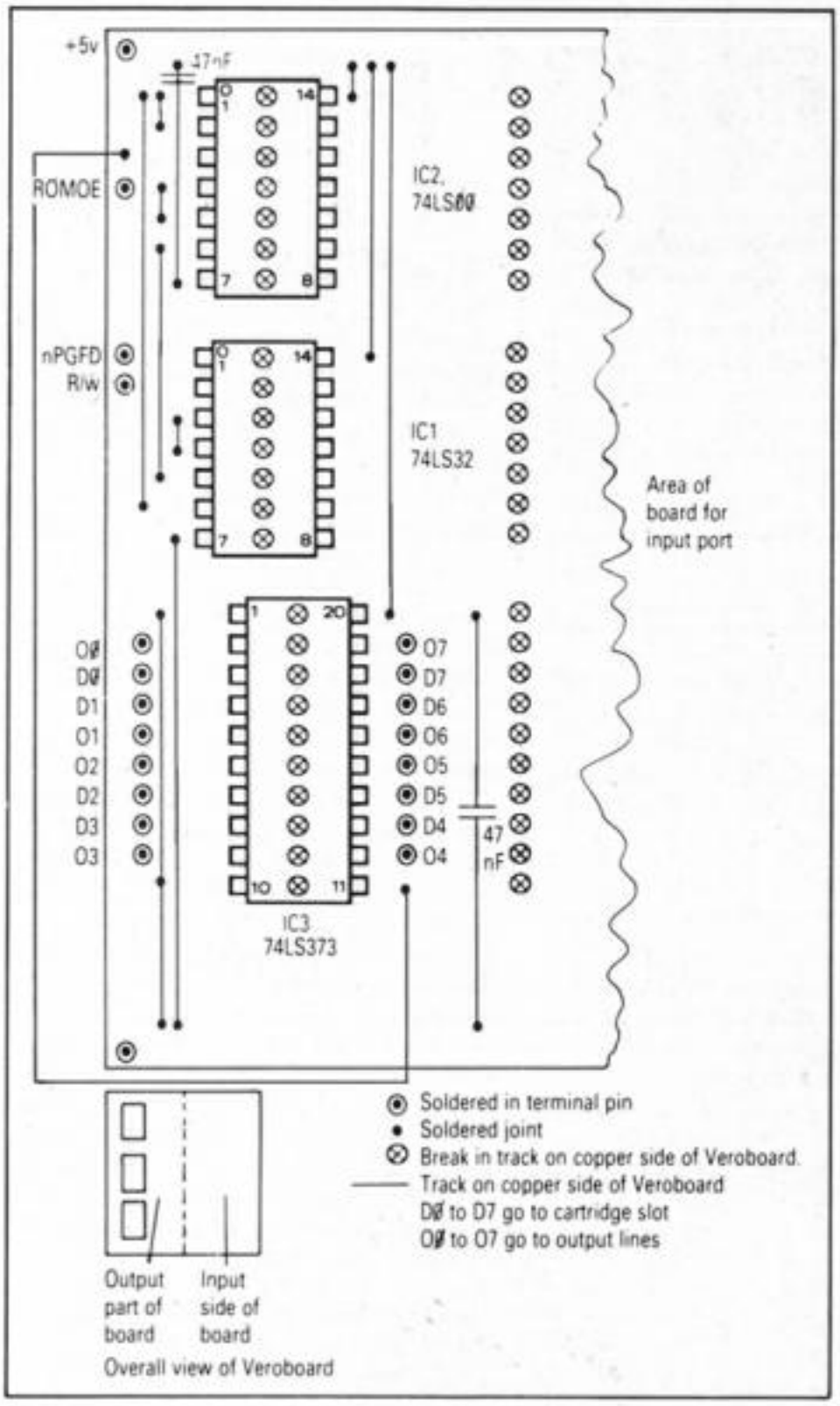

Figure II: Layout for output port

OR and NAND gates

An OR gate, as found in the LS32 chip, is quite simple. If either of its two inputs are set to one, then the output will also be a one. We can write:

Input 1	Input 2	Output
0	0	0
1	0	1
0	1	1
1	1	1

This is called the truth table of the OR gate. The NAND gate is a little more complex.

Input 1	Input 2	Output
0	0	1
1	0	1
0	1	1
1	1	0

As you can see, the NAND gate output is equal to one as long as the inputs are not all equal to one. In the I/O circuit, we connect the two inputs together. In this case, Input 1 will be the same as Input 2, and so we can simplify the above down to:

INPUT	OUTPUT
0	1
1	0

This process is called inversion. See if you can use the truth tables above to work out what outputs are required from the cartridge port to allow the latch to put the contents of the data bus on to the latch output lines.

data lines. Thus we need to arrange things so that the select line to the LS373 is usually low but goes high when we want to write a byte of data to the output port. This is done by the arrangement of OR and NAND gates in IC1 and IC2.

Thus a ? command from Basic or an STA from assembler will store a value in the output port, which will remain there until an address in the range FD00 to FDFF is written to again.

The select signal is actually an electrical pulse, and on occasions such pulses can cause the computer to crash. For this reason, 47nF ceramic capacitors are connected across the power supply pins of the two integrated circuits.

Figure II shows the veroboard layout for the circuit. We use a fairly large piece so as to leave plenty of room for the input part of the circuit. Take care to cut the tracks where an x is marked on the diagram, and ensure there are no short circuits between tracks or between the pins on the integrated circuits.

It is best to use sockets for the integrated circuits – 14 pin ones for the 74LS00 and 74LS32 chips and a 20 pin socket for the 74LS373 chip. When assembling the circuit, insert the wire links and the sockets first, followed by the veropins, then the ceramic capacitors.

All the components, with the exception of the connector for the cartridge, are available from stockists such as Rapid Electronics, Electromail or any of the other mail order component companies. Make sure that you buy 74LS type logic chips; the 74 series device, without the LS in the part number, is not suitable for this circuit.

The double-sided edge connector used to connect the circuit to the cartridge port is available from Electromail, part number 468-709; it is

Turn to Page 50 ▶

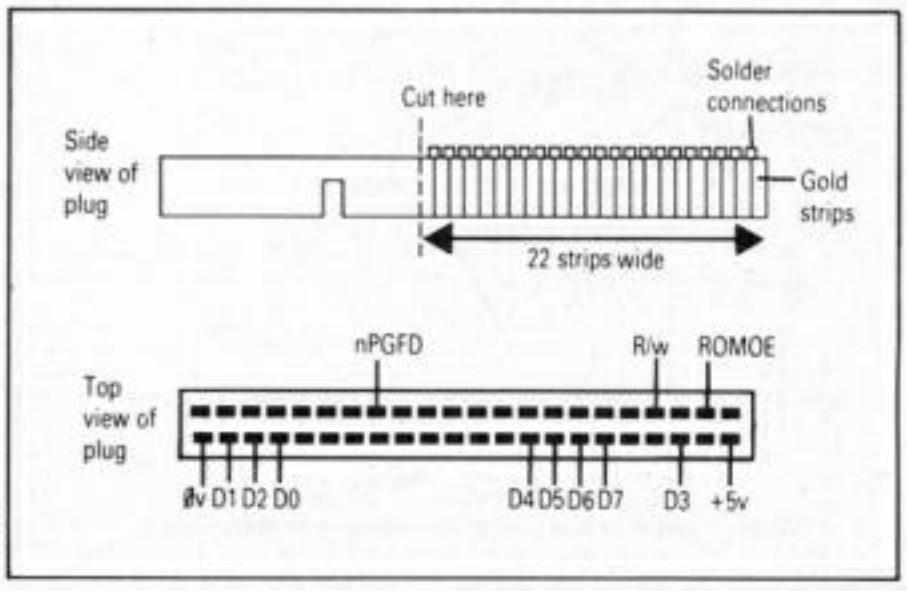

Figure III: Connections to plug

◀ *From Page 49*

described as a 0.1in 43 way double sided edge plug. You'll need to cut it to size, removing the end with the notch in it to give you a 22 way connector.

Count from the end without the locating notch in it, then cut the connector carefully using a hacksaw between the gold edge connectors. Use a file to smooth down the cut end.

The ribbon cable can then be soldered directly to the connections on the strip. Don't solder this while it is plugged in to the Electron, even if the micro is turned off.

Once you've soldered the ribbon cable into place, and after carefully checking it, you may like to use epoxy resin to glue the ribbon cable to the plug as well to give extra support. Again, make sure there are no short circuits between pins.

Final stages

The final part of the construction lies in joining the ribbon cable from the edge connector to the veropins on the circuit board. The ends of the ribbon cable should be bared and twisted around the veropins before being soldered to get a good mechanical joint.

The veropins marked output are for outgoing electrical signals. You could use a variety of connectors here – I'll look at some of them in detail next month. For now though, simply wire up the circuit shown in Figure IV. This will be used to test the output port, and you should temporarily connect the resistors to the D0 to D7 lines.

Check all wiring carefully, especially that to the edge connector. Ensure there are no blobs of solder or whiskers of wire between tracks on the veroboard. Turn the Electron off, remove or turn off any peripherals that use page &FD and then insert the edge connector into the cartridge port nearest to the keyboard, taking care to get it the right way around. If you do have difficulties, you may need to file a little more off the edge connector.

Now turn the the Electron on. If the normal start up message doesn't appear within a second or so turn off immediately, unplug the edge connector and check the wiring.

Once a start up message has appeared, type in Program I and run it:

```
10 ?&FD00 = 0
20 FOR I=0 TO 255
30 ?&FD00 = I
40 FOR J=1 TO 200:NEXT J
50 NEXT I
```

You should see the LEDs go on in sqeuence as the test runs – they will effectively display the binary value (on is a 1, off is a 0) of the number sent to the latch by line 30.

Should this test work, congratulations, you've got the output port working. Next month we'll finish the I/O port off and start looking at programming it and connecting other devices to it.

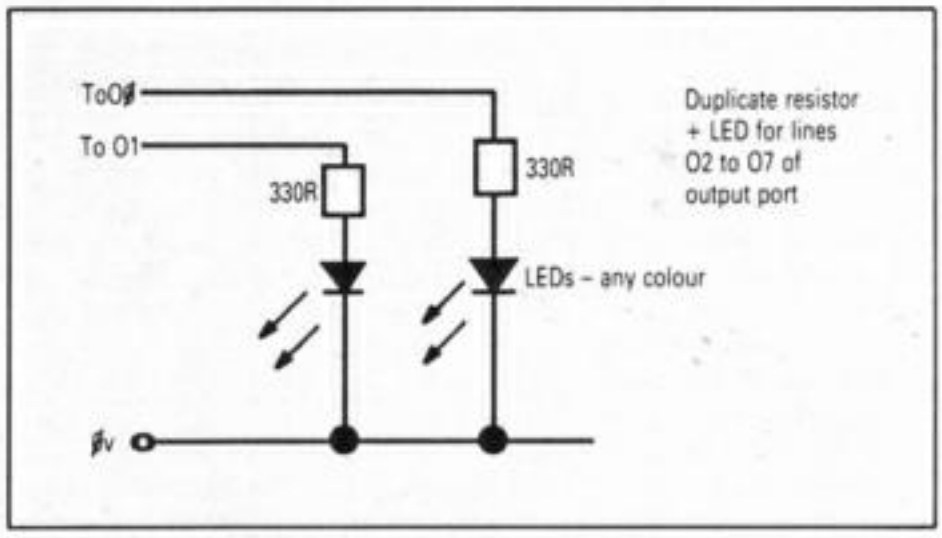

Figure IV: Wiring up the output port

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Try to avoid getting in a jam in Stuart Bain's fast arcade game

GOBBLER

GOBBLER is a superb variation on that old arcade favourite, Pac-Man. For those that have never seen the game – and it's hard to believe that there is anyone who hasn't – the object is to guide your little man around a complex maze in search of raspberry jam tarts. These are littered all over the place and simply running over one enables you to gobble it up.

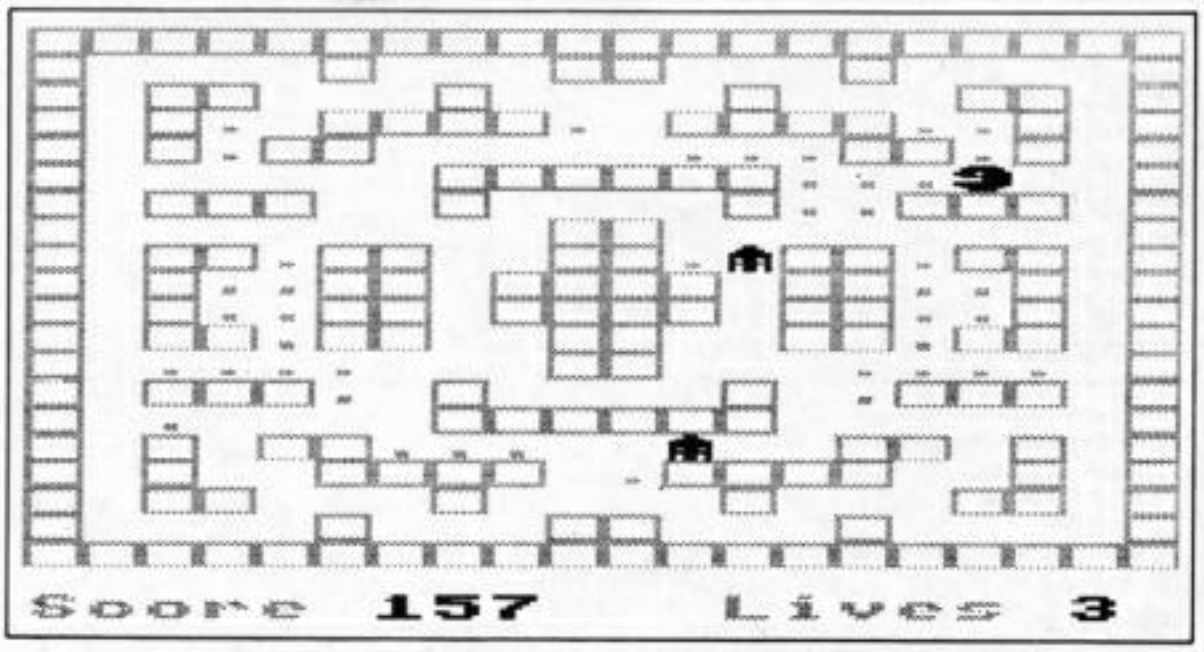
Two monstrous ghostly creatures inhabit the maze and devour anyone who dares enter. Watch out for these crafty devils, as they sneak up behind you and pounce when you least expect it.

You have three lives, and if you manage to gobble up all the jam tarts you'll be transported to another maze, with even meaner adversaries.

Never more than two monsters chase you, but they get faster as each screen is completed – without any apparent loss of speed in your character's movement.

Although Gobbler isn't by any means a new idea in arcade games, dating as it does back to the very early days of computers and arcade machines – what makes this version interesting is that it is so compact. There are two complete mazes and the monsters exhibit quite a high degree of intelligence.

Programmers should study the listing, as many tips and techniques can be learnt from it. The game is much faster than you might expect – it's blinding in Turbo mode – and the movement is very smooth too.



CONTROLS

Z	Left
X	Right
*	Up
?	Down

VARIABLES

S(19,19)	Array to store the maze
L	The level
sc	The score
m	Number of men left
A%(1)	Coordinates of monster one
B%(1)	Coordinates of monster two
X%	Your x coordinate
Y%	Your y coordinate

```
   10 REM Gobbler
   20 REM By Stuart Bain
   30 REM (c) Electron User
   40 MODE 5
   50 VDU23,1,0;0;0;0;23,224,60,126,23
9,127,15,255,126,60,23,225,24,60,126,1
26,90,126,90,90,23,226,255,129,129,129
,129,129,129,255
   60 DIMS(19,19),A%(1),B%(1)
   70 L=1:m=3:sc=0
   80 REPEAT
   90 RESTORE
  100 IF RND(4)<3 FOR I=1 TO 10:READ A
$:NEXT:READ I
  110 FOR I=0 TO 9
  120 READ A$
  130 FOR J=1 TO 10
  140 B$=MID$(A$,J,1)
  150 S(J-1,I)=-46*(B$=".")-226*(B$="0
")
  160 NEXT:NEXT
  170 READ c
  180 FOR I=0 TO 9
  190 FOR J=10 TO 19
  200 S(J,I)=S(19-J,I):NEXT,:FORI=10TO
19:FORJ=0TO19:S(J,I)=S(J,19-I):NEXT,:S
(1,1)=32
  210 REPEAT
  220 CLS:COLOUR1
  230 FOR I=0 TO 19
  240 FOR J=0 TO 19
  250 VDUS(J,I)
  260 NEXT:NEXT
  270 PRINT TAB(0,21)"Score ";TAB(12)"
Lives ";
  280 COLOUR 3:PRINT;m;TAB(6,21);sc
  290 SOUND1,-1,150,3
  300 X%=1:Y%=1
  310 A%(0)=18:A%(1)=1:B%(0)=1:B%(1)=1
8:d=0
  320 VDU 17,3,31,1,1,224,17,2,31,1,18
,225,31,18,1,225
  330 REPEAT
  340 x%=X%:y%=Y%
  350 H%=INKEY-98-INKEY-67
  360 V%=INKEY-73-INKEY-105
  370 IF H%=0 AND V%=0 GOTO390 ELSE IF
 H% AND V% V%=0
  380 IF S(X%+H%,Y%+V%)<>226 X%=X%+H%:
Y%=Y%+V%:VDU 31,x%,y%,32,17,3,31,X%,Y%
,224:IF S(X%,Y%)=46 sc=sc+1:c=c-1:SOUN
D 1,-15,180,1:S(X%,Y%)=32:PRINT TAB(6,
21);sc
  390 FOR I%=0 TO 1
  400 IF RND(10)>L FORJ=0TO 30:NEXT, E
LSE x%=A%(I%):y%=B%(I%):H%=SGN(X%-x%):
V%=SGN(Y%-y%):x%=x%-H%*(S(x%+H%,y%)<>2
26):y%=y%-V%*(S(x%,y%+V%)<>226):VDU17,
1,31,A%(I%),B%(I%),S(A%(I%),B%(I%)),17
,2,31,x%,y%,225:A%(I%)=x%:B%(I%)=y%:NE
XT
  410 IF (X%=A%(0) AND Y%=B%(0)) OR (X
%=A%(1) AND Y%=B%(1)) d=TRUE
  420 UNTIL c=0 OR d
  430 IF c=0 L=L-1*(L<9):FOR I=110 TO
140 STEP 10:SOUND 1,-1,I,3:NEXT:UNTIL
1:UNTIL 0 ELSE d=0:m=m-1:SOUND 1,-1,40
,3:SOUND 1,-1,10,3:UNTIL m=0:UNTIL 1
  440 COLOUR 2
  450 PRINT TAB(1,24)"G A M E   O V E
R  Press Space to play"
  460 REPEAT UNTIL INKEY-99
  470 RUN
  480 DATA 0000000000
  490 DATA 0.....00..
  500 DATA 0.000....0
  510 DATA 0.0.000.00
  520 DATA 0.0.....0.
  530 DATA 0...0..00.
  540 DATA 0.0.00.0..
  550 DATA 0.0....0.0
  560 DATA 0.0000...0
  570 DATA 0..0...0.0
  580 DATA 195
  590 DATA 0000000000
  600 DATA 0....0...0
  610 DATA 0.00...0..
  620 DATA 0.0..0000.
  630 DATA 0.0.00....
  640 DATA 0......000
  650 DATA 0.000..0..
  660 DATA 0........0
  670 DATA 0.00.00..0
  680 DATA 0.0..00.00
  690 DATA 199
```

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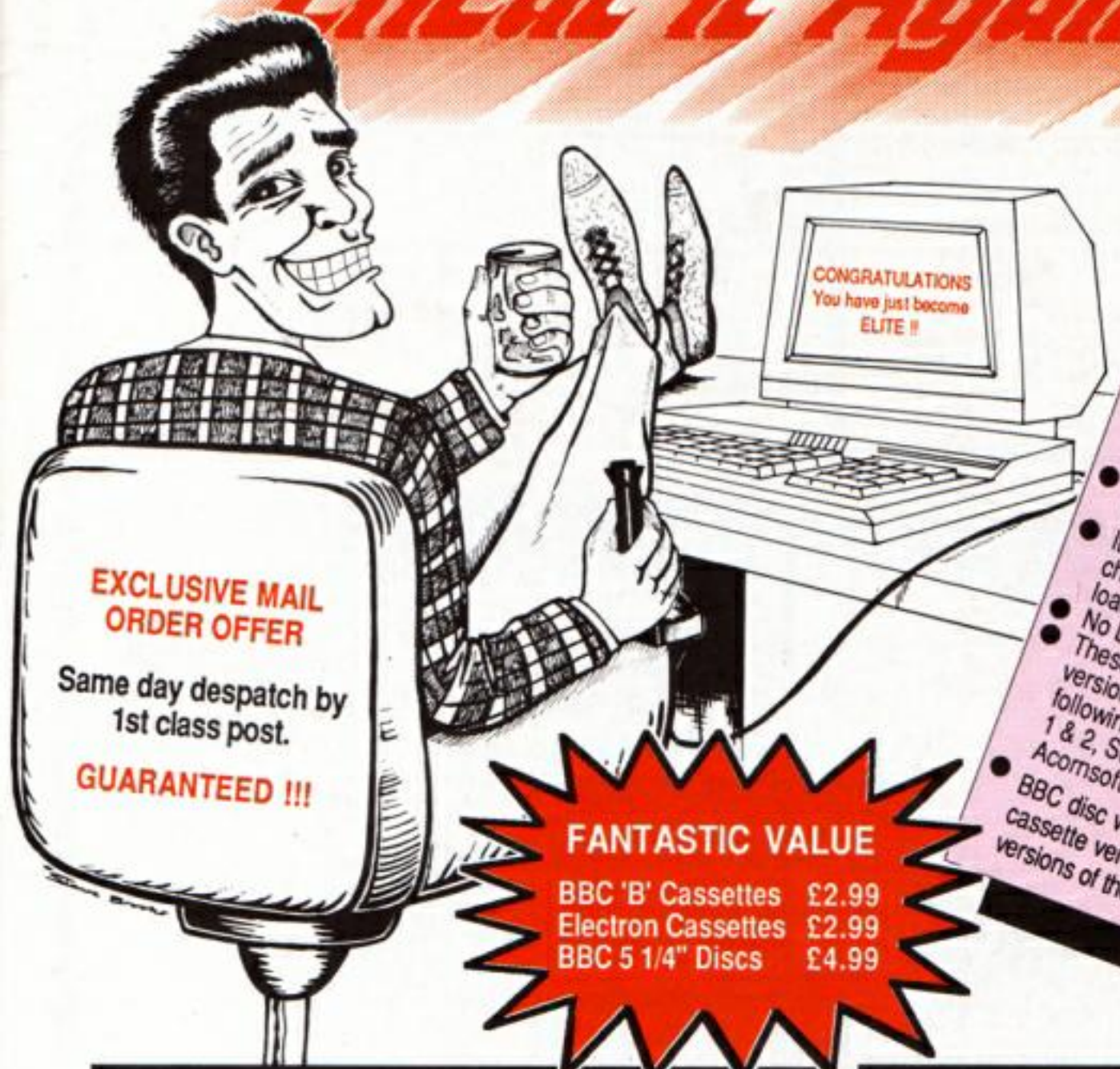

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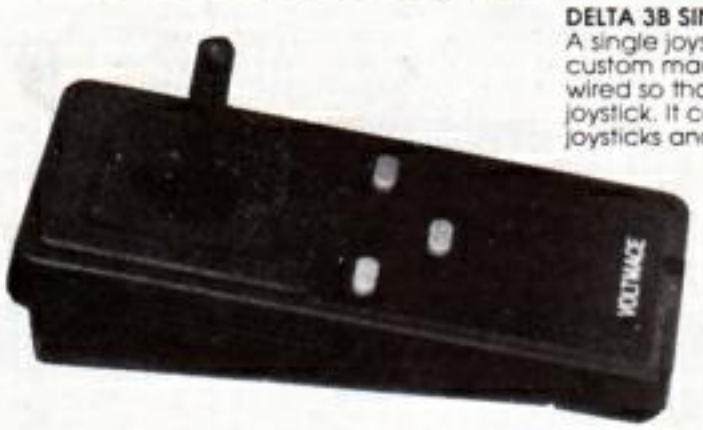

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QUAZAR

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PIPELINE
(Superior)

At last the long awaited sequel to the excellent Ravenskull. The game is in a new scenario, the moon Io, and it is your task to prevent mutant androids from destroying the Sulphur plant which is providing Earth with much needed resources. Infinitely superior to Ravenskull, Pipeline features larger screens, more puzzles and superb graphics and screen designer to allow you to create a whole new game if you wish. Highly recommended.

BBC or Electron Cassette £7.50
BBC 5 1/4" Disc £9.50
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NEW

★= Electron disc available
M = Master compatible

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M = Master compatible

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M = Master compatible

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pipeline

Beware of the fast-moving flame

Trapped near a pipeline complex

The Character Designer

The Level Designer

PIPELINE — A Fiery Adventure in Space and Time

In the 25th Century, the Earth's supplies of sulphur had become so badly depleted that mining operations were established on Io, one of the moons of Jupiter. Following a volcanic eruption on Io, the robot-controlled extraction platforms have been engulfed in a burning sea of sulphur and are now malfunctioning.

You have been sent to the platforms in a single-handed, death-defying mission, to collect the precious drums of sulphur, close down operations and return to Earth. To complete your task, you must carefully weave your way through a complex series of pipelines in each of four platforms. But beware of the fast-moving flames and carnivorous plants!

Pipeline is a massive four level arcade-adventure, that combines the best features of a game like Ravenskull, with a novel pipeline system. Once you enter a pipe, there is no going back. You are carried past junctions, around bends and over other pipes, to be deposited at the end, wherever that might be.

In addition to an exciting, novel arcade game, Pipeline also includes a character designer and a very powerful level designer. Design your own level, including intricate puzzles and a vast array of pipeline complexes, and test your route through the pipes directly on the level design screen. With practice, you will soon be able to design complicated and highly unusual games.

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(Compatible with the BBC B, B+ and Master Series computers)

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PRIZE COMPETITION — DESIGN A LEVEL

If you complete Pipeline, you can enter our competition. To enter you should send in your score and submit a level design to Superior Software. Prizes of £100 each will be awarded for the highest score and the best level design. Books on astronomy will be awarded to 20 runners-up. Each prize-winner will also receive a signed congratulatory certificate. The best level designs may be used in a future Superior Software program.

Closing date: 31st January, 1989.

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The screen pictures show the BBC Micro version of the game.

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